RAILROAD GAZETTE

FRIDAY, MARCH 21, 1902.

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Contributions

Block Signals in Tunnels.

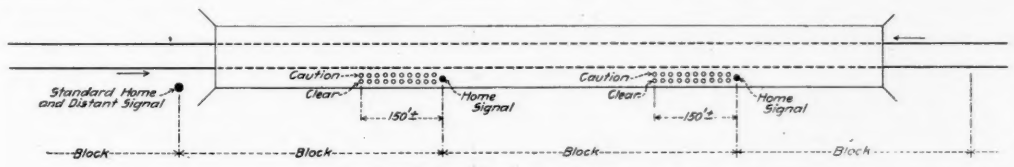
Mauch Chunk, Feb. 24, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I am by no means a signal expert, but the New York tunnel collision has set a good many of us to thinking, so I venture to ask, What is the matter with two rows of white and colored lights? Please look at the accompanying sketch.

Where two or more block sections in a tunnel are desirable, indicate caution by a series of incandescent lamps placed, 15 or 20 ft. apart, at the height of engine cab window, and to cover a distance of 150 or 200 ft.; the caution indication to be shown by globes of standard color, and clear indication, for second block ahead, by an equal number of incandescent lamps of proper standard color placed in approximately the same location as the caution lamps. The home or stop signal to be at the end of the series of caution lights and thereby be readily located. The length of block is to be determined, of course, by the speed of trains and the distance required to make a stop. HERKOS.

[See a discussion in the editorial columns.—EDITOR.]



Proposed Arrangement of Signals for a Tunnel.

The Car Rental Question.

March 10, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Like others, who are interested in the car rental question, may I add something to the long controversy, the end of which is not yet in sight.

If simplicity is wanted why not start out by making the rental begin and end on the dates of delivery and return, without any other handicap? This would indeed be simplicity, and such a rental the correct charge for leased property. Further, all cars are not alike, as to cost and capacity, and rentals should accordingly be graded on a value scale.

Let it be granted that rental is placed on the value of the car, then to simplify the taking of records, each class of car should have placed upon it a special class mark: as "A 1," or in some other simple manner. This class mark to be in a uniformly prominent place on all cars. "A 1" the highest standard for 150,000 capacity, "A 2" for 120,000, "A 3" for 80,000, and so on down; station master, checker or yardmaster to report cars by their special classification for car rentals mark, usual car number and initials.

There is a likelihood of the companies having the highest class of rolling stock, being punished for their intelligence and outlay. Companies having inferior cars will certainly retain the larger ones, loading the inferior or small cars to their good natured connections, on the basis that everything being equal as to rental, keep that which returns the most profit. If the present proposition, 25 cents on all cars, is carried out, new corporations, having up-to-date large cars, will be the sufferers. It is quite noticeable at present, under the system in vogue, that small cars are returned and the large cars held, as giving the greatest profit. Car rentals should be made to encourage advancement, not only on capital earnings, but also in the quality and improvement of cars generally. If any change is decided on, such points should receive the earnest attention of the managers, and not be left to those who later on will not be made responsible for past errors of judgment or want of knowledge of all the details, operative and financial. GEN'L SUPT.

The Relief of the Brooklyn Bridge.

New York, March 12, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In an editorial article of your edition of March 7, 1902, it is stated that I disapproved the plan brought forward by the Board of Expert Engineers (convened by my predecessor to suggest a plan for the relief of the congestion at the New York terminal of the Brooklyn bridge) for several reasons, one of which is that an elevated railroad up Centre street should not be permitted. The Corporation Counsel of the City of New York has since given an opinion to the effect that the Commissioner of Bridges has no authority to build an elevated railroad on Centre street. The same opinion applies also to the so-called "Martin Plan," which is merely a modification of the plan proposed by the board. As one of the editors of your journal was one of the three experts on that board, it does not seem in the best of taste to use the columns of your journal for a one-sided presentation of the matter.

My principal objections to the plan of the Board of Experts were: First, that the elevated railroad on Centre street would ruin some very costly, architecturally monumental buildings belonging to the city, without a necessity for it; and, next, that that plan made no provision whatever for relief of the crush at the City Hall station of the Manhattan Elevated Railroad, which is, so to speak, under the same roof with the Brooklyn Bridge terminal station. The public is as vitally interested in the relief of the congestion at the one point as at the other.

The plan which I propose gives relief at both points, and provides the necessary approaches to three bridges over the East River with the least damage to property. It will also make it practicable to despatch trains from the City Hall region, by way of Second Avenue and Blackwell's Island Bridge, to Queens county, Long Island. No Second Avenue trains are now being run to the City Hall station because of the grade crossing at Chatham Square; but it is important that they should be able to so run when Blackwell's Island Bridge is finished.

My plan will accommodate a wider region than the plan of the board. All this has relation to the elevated railroad service only.

As regards the trolley surface cars of Brooklyn, it is my opinion that they should be kept out of Manhattan and off the three suspension bridges altogether. The electric elevated railroads will have more than ample capacity for all the passenger traffic in non-rush hours. In place of the surface cars I propose moving platforms with seats, to be operated in rush hours, or at other times when large crowds are to be carried. One track for a moving platform is equal in transportation capacity to four tracks for crowded trolley cars. On the platforms every one can have a seat; on the trolley cars two-thirds of the passengers would have to stand.

At the Brooklyn end of each bridge it is comparatively easy and cheap to lay out a well-ordered surface car terminal under the loop for the movable platform, all under one roof. From this point the passenger can take a surface car for his destination. At the terminals of the bridges in Brooklyn plenty of room can be found for such terminal arrangements. There is no room at the New York end of any bridge for trolley terminals.

The loop system proposed by the Board of Experts, and also by Mr. Martin, for the surface track on the Brooklyn Bridge, would give relief for a short time only. The number of surface cars passing over the bridge would have been increased only about 20 per cent., and that at imminent inconvenience, if not danger, to vehicular traffic.

Of course, no moving platform can be put on the Brooklyn Bridge at present. It cannot be done until after the rebuilding of the suspended structure for double decks. This work cannot be done until another bridge over the East River is completed. Only then will a movable platform on the Brooklyn Bridge become feasible.

The practicability and economy of moving platforms cannot be questioned by engineers acquainted with their construction and operation. For a thin traffic, such as exists during the non-rush hours, they would be wasteful. But it is not intended to run them at such times.

In my plan a proposition is contained to utilize the property area of the terminal bridge station for a much needed municipal office building. The estimate of $6,000,000 for that building is in no sense chargeable to bridge account.

The city is now paying about $360,000 annually in rentals for office room. It is probably the only large city in the world which carries on its government in rented offices. The municipal office building may be built in five, ten or twenty years, but the foundation for it and of the station should be provided for at the beginning.

The estimate of $14,500,000 not only included the $6,000,000 for that building, but also for the new structures and stations of the Manhattan Elevated Railroad, purchases of additional costly property, as well as terminals for three bridges. Estimates are easily misrepresented.

Your editorial mentions that "the Board was particularly anxious to put out of their mind the notion of building a monument." I believe that if their plan had been carried out it would have been nevertheless a monument, but of eye-sores, and one not to be proud of. The municipal building, whenever put up, can be made monumental or not—just as any other office building; but it seems to be the part of wisdom that the city should some time or other utilize the costly property which it owns for something else than mere tracks and car sheds.

If this is providing a monument, it would certainly be one of a different kind from the present bridge terminal, notorious for its ugliness.

GUSTAV LINDENTHAL.

[The opinion of the Corporation Counsel in this matter should be taken only as pointing to a probability at best. It is at least doubtful if the courts would sustain it. At any rate it appears to apply to the Commissioner's plan just as much as to the plan of the Board.—EDITOR.]

Per Diem Problems.

Dyea, March 7, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I have read with much interest the rules recommended by the Committee of the Western Association of Car Service Officers, for the enforcement of per diem, as published in your issue of Feb. 28, and I think that in most points they are excellent. There are, however, some features which will permit of further consideration.

For one thing I feel sure, that per diem can be successfully inaugurated by one-half or more roads operating 50 per cent. or more of the equipment of the section in which the reform is started. The experience of the Illinois Central showed this. I cannot say that it proved it; but officers of that road seem to feel entirely confident. But even if there be a doubt we should not be too timid. This is a great cause!

The next important point is the free time. No free time over the one day of delivery should be permitted. It is necessary to waive the date of delivery, for this reason: Should A deliver its car to B, July 1 at 10 p.m., and B deliver it to C, July 2 at 9 a.m., the car would be in B's possession only 11 hours, but would have been there parts of two days, yet it would not be fair to charge more than one day for it. Again, a car under through load might move over parts of three roads in one day (allowing eight hours to each) and the owner would receive three days' compensation. Under the plan of waiving one day the owner will receive nothing from a road which keeps a car one day or less; but this is certainly better than waiving four days.

The rate named, 25 cents a day, cannot be called anything more than nominal. This will provide only for the actual fixed charges and the cost of maintaining a car 24 hours. If this rate should prevail it should cover every 24 hours' service rendered by the car, otherwise it would not remunerate the owner.

If four days' service is waived on all cars those roads, especially the trunk lines, that do not originate business, will, in many instances, receive the service of the other roads' cars free of expense. For instance, the L. S. & M. S. received during the month of June from the C., H. & D., 50 cars per day, destined east via the N. Y. C. & H. R., consisting of live stock, provisions, grain, etc. The distance from Toledo to Buffalo being 296 miles, 40 per cent. of the cars are moved and delivered in one day, 40 per cent. in two days, and the remaining 20 per cent. in three days. At the close of the month the C., H. & D. would be in debt to the L. S. & M. S., even after allowing it the free use of C., H. & D. cars:

40 per cent. of 50 cars, 1 day each, 20 days.
40 per cent. of 50 cars, 2 days each, 40 days.
20 per cent. of 50 cars, 3 days each, 30 days.

On a day's deliveries of 50 cars the L. S. & M. S. has cars a total of 90 days, whereas it is entitled to 200 days, leaving a surplus of 110 days free time for one day or $30 \times 110 = 3{,}300$ surplus free days for month. Now, the C., H. & D. delivers cars in local service to the L. S. & M. S. at Indianapolis, three a day. The L. S. & M. S. holds them an average of 30 days each, equal to 90 cars, 30 days each, or 2,700 days for the month.

Section 6 says "The total number of cars that have cleared the reporting line during the current month having been ascertained and multiplied by four, the result will be deducted from the total number of days due."

On this basis we have a reserve of 3,300 car days in

the Toledo account, which will more than offset the 2,700 days due on the Indianapolis account. It will leave a balance of 600 days, with which the L. S. & M. S. can delay cars further without costing it a single cent.

It is a vicious principle to exempt private cars. The committee must have been suffering from a temporary flexibility of backbone when they made this recommendation. Nothing but the costly and unfair long-time rate-cutting contracts with the big car owners could have suggested the idea. The same rules should apply to all cars, including railroad companies' cars, private cars, and cars on Belt, switching and car ferry lines.

Section 11. Per diem will meet opposition from roads not friendly to its adoption, and they will take advantage of every point to discourage its success and continuance. The American Railway Association, which must pass on its adoption, will, therefore, be called upon to provide such rules as will make its enforcement simple and obviate the necessity for calling on the committee frequently to arbitrate. A committee should be appointed in each section as marked off by the boundaries of the standard time, for one or two years, until the reform is well and safely launched.

It is possible that some roads may wish to keep their cars off the lines of non-member roads. In this case the Secretary should issue notice to member roads, on receipt of request from proper officer of road owning cars, and members of the per diem agreement should be governed accordingly.

I cannot at this time go into all the reasons for the claims that I now make, but I felt it my duty to jot them down, even though hurriedly and in imperfect shape, lest the interests which desire to see delay or confusion be encouraged by the silence or inaction of the forces of progress. All like reforms have met with opposition when inaugurated. This will probably be no exception. It will be found easier, however, to concede greater latitude after the new plan is in use, and the necessity for such concession is practically demonstrated, than it will be to curtail unfair advantages after selfish interests have enjoyed them for a time. AUDITOR.

Concerning Delegation of Work.

Burlington & Missouri River Railroad in Nebraska,
Wymore, Neb., Feb. 27, 1902.

To the Editor of the Railroad Gazette.

The editorial in your issue of Feb. 21, with reference to organization in the office of the superintendent of motive power, should suggest to all such officials one of the primary requisites for successful work. As the writer of article referred to says, it is so common for a superintendent of motive power to be loaded down with routine correspondence and petty office work that little is now thought of it. But could not a very great amount of this office work, which now receives the personal attention of the head of the department, be handled by an intelligent chief clerk. The head of the motive power department of nearly all railroads generally has a good-sized office force, together with a chief clerk who is paid upwards of $100 per month. A salary such as this ought to secure a chief clerk with considerable intelligence and executive ability. Why is not this man competent to take care of nearly every detail of the office? Would not he eventually make a far better man if he was vested with a little responsibility than if he is held down to the mere statistical and routine work of the office? How many motive power officials consult with their chief clerks when considering some contemplated economy with a view of ascertaining where it is best to make the desired reduction? The present tendency is to make a sharp and distinct line between the executive and the office, when it certainly should be the reverse. The head of the department should be in the closest touch with his chief clerk and the latter should be regarded very much as an assistant to the former. Is not he the man to know just where the increases and high costs in mechanical department operating expenses occur, and would not he be very likely to know of some reason for it if asked concerning it?

Allowing the chief clerk to dig up the whys and wherefores leaves the superintendent of motive power with time to study and plan important work and yet not be ignorant of the details of his department. When he has been away for a few days, he will find, on his return, an immense amount of correspondence heaped up on his desk awaiting his disposal, the greater part of which should have been disposed of by his chief clerk, who should be competent to take his place in nearly all matters during his absence. Here is where the perfect understanding between the chife clerk and the executive is valuable. He should be so well acquainted with his employer's plans and methods, that in the latter's absence, only a small portion of his office work should be delayed.

The new General Manager of the American Locomotive Works furnishes us with a good example of a man who has the ability to perfect organization and direct others. As Superintendent of Motive Power of a large railroad system, his office had an almost perfect organization. He demanded and received from his chief clerk the closest cooperation in all matters, and in consequence, the chief clerkship in his office carried with it a great amount of responsibility.

The writer has often wondered why all operating department officials, from the division superintendent up, expect and receive more assistance from their chief clerks, than most superintendents of motive power would even think of asking from their chief clerks. Is it because the motive power officials cannot obtain competent chief clerks, or is it because they think that no man can be competent to assist them unless he has had a training at a bench or on an engine? HARLAN J. GERMAN.

Spread of Sparks from Locomotives as Disclosed by Observations Along the Right-of-Way.*

IV.

It has been shown that all locomotives when working under normal conditions discharge particles of ash and fuel from the top of their stacks. It has been shown that the fuel-value of the material thus discharged is considerable. We are now to consider the distribution of this material over the surface of the ground in the immediate vicinity of the track, and the liability of fire which may arise from its presence.

To secure information covering this point, investigations under the direction of the author were first undertaken by Mr. George F. Mug, M. E., who made observations at the Purdue experimental locomotive and also along the right-of-way. While Mr. Mug obtained much valuable data, his efforts were largely given to the development of methods of procedure. In this he was so successful that subsequent investigations have been based upon his work. The most elaborate data thus far obtained are those of Messrs. Ducas and Dill, from whose thesis the facts of this chapter are chiefly drawn.

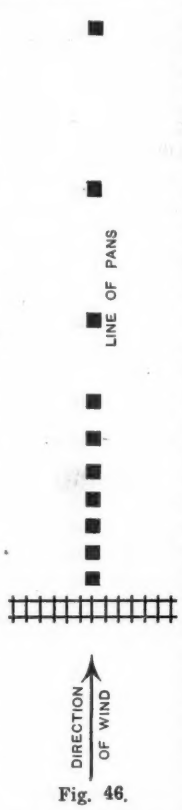


Fig. 46.

The method employed may be described as follows: Ten metal pans 22 in. sq. were placed in line at right angles to the track from 10 to 100 ft. apart, and on the leeward side, as indicated by Fig 46. . . . The pans were placed on one side or the other of the track, according to the direction of the wind. A layer of muslin in the bottom of each pan served to retain sparks which otherwise might have been blown away by the wind, and was expected to indicate by a scorched mark the degree of heat in the spark. The place selected for conducting the tests was at the top of a grade on the Lake Erie & Western, at a point about two miles west of the Lafayette station. A profile of the road in this vicinity is given as Fig. 48. The section of track involved is used jointly by the L. E. & W. R. R. and by the Big Four Company, all Indianapolis and Chicago trains of the latter company passing over it. It is to be noted that, from the start at the station, locomotives have a heavy pull all the way to the point where the observations were made, with heavy grades still beyond. They were

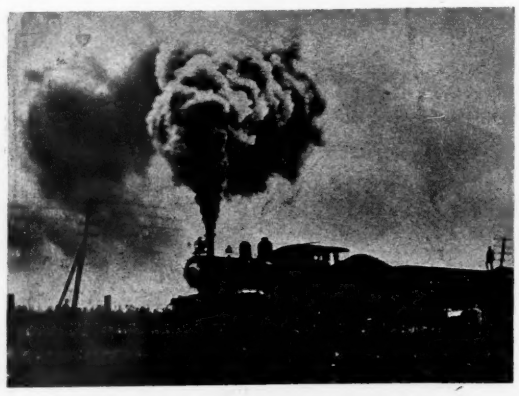


Fig. 49.—One of the Two Locomotives During the Test, the Record for Which is Given Below.

therefore invariably working very hard when passing the point of observation. Observations were made only on those trains which came up the grade. When others passed the pans were covered.

Observations were recorded as to the direction of wind, velocity of wind, temperature of the atmosphere, character of train (whether freight or passenger), number of cars in train, time required to pass between two stakes set at a known distance apart, type, name and number of locomotive, and character of smoke (light, dark, very dark, or black). From the observed time in passing between the two stakes the speed of the train was calculated. A photograph of each train was also taken. After the train had passed, all the sparks caught in each pan were carefully collected, placed in a separate bottle, and properly labelled.

[The data which are presented under this head are elaborate. We give below the more important facts concerning a single test.—Editor.]

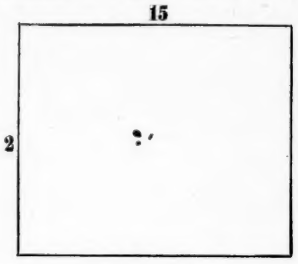
TEST NO. 2.

In the rectangles below, the spots show the number and actual size of sparks collected in each pan. The rectangle does not indicate the size of the pan, which was 22 in. sq.

The sparks collected include those deposited by the locomotive at the head of the train (Fig. 49) and by the "pusher" at its rear.

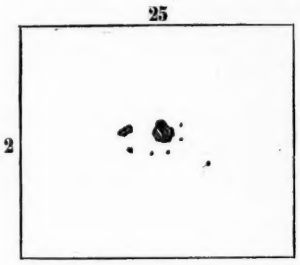
Speed of train..... 15.7 miles per hour
Velocity of wind..... 11.6 miles per hour
Number of freight cars..... 29

15



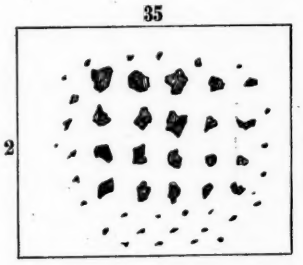
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 15 ft. from the center of the track.

25



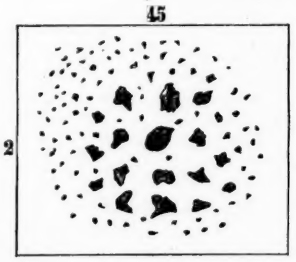
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 25 ft. from the center of the track.

35



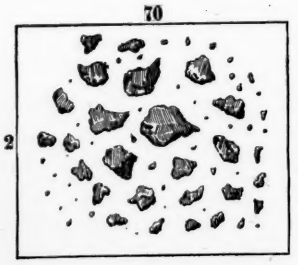
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 35 ft. from the center of the track.

45



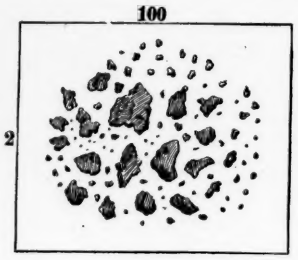
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 45 ft. from the center of the track.

70



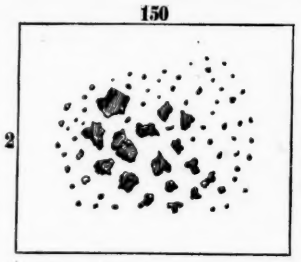
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 70 ft. from the center of the track.

100



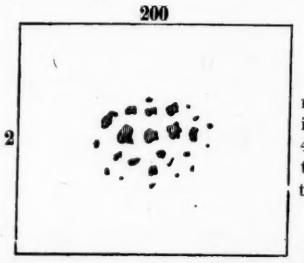
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 100 ft. from the center of the track.

150



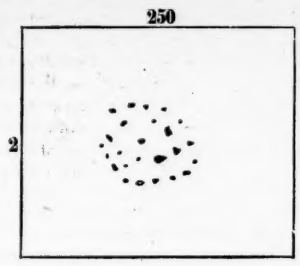
Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 150 ft. from the center of the track.

200

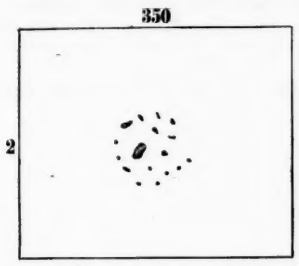


Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 200 ft. from the center of the track.

*Abstracted from advance sheets of a book now in press entitled "Locomotive Sparks," by W. F. M. Goss. To be issued by John Wiley & Sons, 43 East Nineteenth street, New York. See the *Railroad Gazette*, Feb. 28, March 7 and 14.



Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 250 ft. from the center of the track.



Actual size and number of sparks falling within an area of 484 sq. in., at a distance of 350 ft. from the center of the track.

To show better the distribution of sparks, the weight caught in each pan is shown graphically by Fig. 50. . . .

A summarized statement of results of experiments to determine the spread of sparks along the right-of-way is as follows:

1. The greatest number of sparks fell at from 35 to 150 ft. from the center of the track. It may, therefore, be assumed, from the data at hand, that the possibility of fire is greatest within these limits.

2. With a few exceptions, the pans nearest the track, i.e., from 15 to 20 ft., caught but few sparks. Local conditions, due to air-currents about the train, may in part be responsible for this.

3. No scorching of the cotton in the pans was in any case observed. This may be accounted for by the fact that during the time the tests were run (in April and May) the temperatures were comparatively low. Some of the larger sparks were quite warm, however, when picked up immediately after falling.

4. Beyond 125 ft. from the center of the track the sparks were of such character as to preclude any possibility of fire from them.

5. In March, preceding the tests, when a light crust of snow covered the ground, it was possible to trace evidence of dust from passing locomotives at a distance of 800 ft. from the track. The wind velocity was high—about 20 miles an hour. Nothing in this observation should be interpreted as in conflict with the statement of the preceding paragraph.

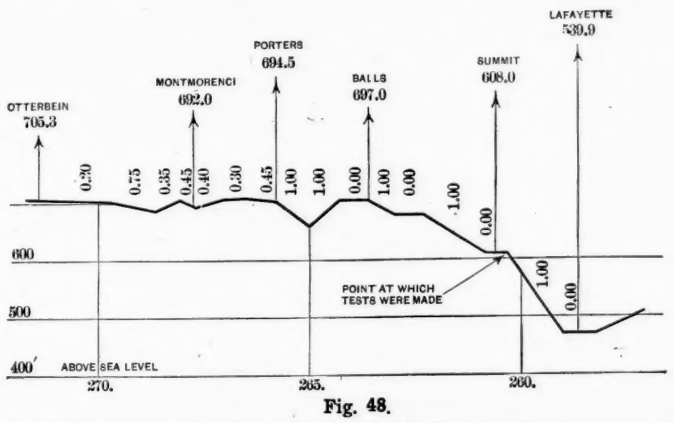


Fig. 48.

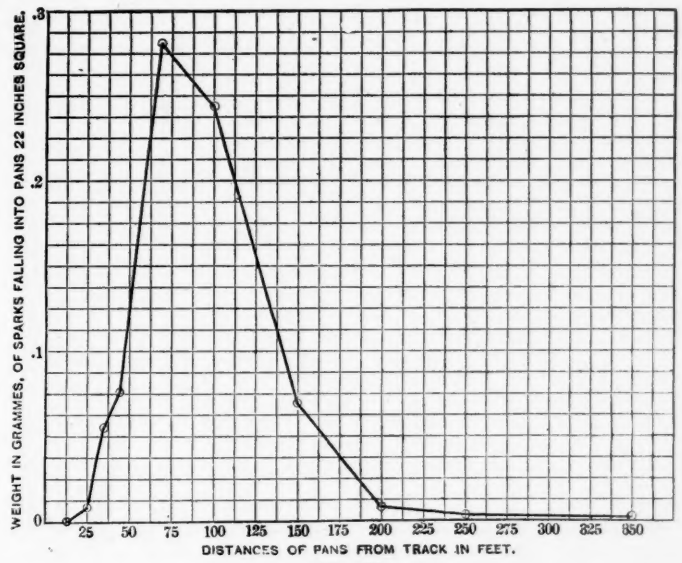


Fig. 50.

Supply and Life of Cross-Ties.*

Cross-tie specifications are being studied with a view to making recommendations to the Association at a future date.

Timber Supply.—The vastness of the supply has not been as much in evidence of late, as an apparent shortage, resulting in changes in character of tie material and the sources from whence it is drawn; and it was deemed best to make some tentative effort to secure light on the subject. Replies to a circular letter are as follows: Of the roads reporting, there are 18, representing a mileage of 17,500, which now secure all their ties of the kind now used from along their own lines, and which have a supply in sight for the next ten years. Of this mileage, on one-half pine ties are the standard. Five roads, with 4,500 mileage, have in the past been able to supply all their own needs, but can continue to do so for less than ten years. Seven roads, with 7,100 mileage, can supply less than all, but 50 per cent. or more, of their own needs for from two to three years on indefinitely. Eleven roads, mileage 19,000, can furnish more than 10 per cent., but less than 50 per cent. Twenty-one roads, mileage 14,500, can supply none or less than 10 per cent. As regards supplies of inferior woods, there were 13 roads, mileage 8,000, reporting none available. All the rest reported supplies sufficient for from three to thirty years. Geographically considered, the figures above are based on replies received representing a mileage of 13,000 in Eastern Canada, the New England and Middle States; 10,000 in Southern Atlantic; 33,000 in the Middle West and Southern States; 6,600 in the Western States.

Besides the roads represented in the figures above, reports were received from the Southern Pacific, Atchison, Topeka & Santa Fe, and the Colorado & Southern. The first two roads are already using treated ties very largely and consequently using inferior timbers; and it did not seem best to include them in the summarizations. The Atchison, Topeka & Santa Fe Railway reported that it had changed its source of supply during the past two years, in that while it formerly used oak ties for the lines in Kansas, Illinois and Iowa, it is now using treated pine ties; and in consequence of the treatment it did not rate as inferior woods those materials which are usually so considered. The Colorado & Southern reported that it will change this season from untreated mountain pine, from which it derives a life of only three years, to the same material treated, which will be used exclusively.

A number of replies from roads reporting large supplies of timber for their future use have qualified their statement with the clause, "if shipments from off our lines are prohibited." Another element in the West which may affect the condition is the possibility of the Government setting aside additional forest reserves, which will, to that extent, cut down the available supplies.

Preserving Methods.—A review of what American railroads have done since 1883 towards tie preservation was given in the last report. Since then the Atchison, Topeka & Santa Fe has compiled a record in detail of treated pine ties which shows the following:

Removed in 1897 on 7 divisions, average life....10.70 years.
Removed in 1898 on 7 divisions, average life....11.06 years.
Removed in 1899 on 7 divisions, average life....11.11 years.
Removed in 1900 on 7 divisions, average life....11.28 years.

Most of the ties had been laid on two divisions, and these (the Rio Grande and the New Mexico Divisions), which have the least rainfall, show the longest average life.

Before deciding to treat its ties, the Atchison, Topeka & Santa Fe tried preliminary experiments in 1881, by having some ties of various kinds of perishable timber treated by Mr. J. P. Card at St. Louis. These were laid at Topeka, Kan., and at La Junta, Colo., with the following results:

At Topeka, Kansas.

Kind of Wood.	No. of ties.	Date laid.	March 6, 1893. No. in track.	Per cent. in track.	Years laid.
Cottonwood	87	Aug. 1, 1882	10	11.5	11.58
Sweet Gum	51	" 1882	..	....	.....
Red Oak	48	" 18, 1882	1	2.1	11.50

A change of Roadmaster has left this record incomplete.

At La Junta, Colorado.

Kind of Wood.	No. of ties.	Date laid.	Mar. 14, '97. No. in track.	Years laid.	Jan. 3, '01. No. in. track.	Years laid.
Black Oak	49	May, 1882	44	14.8	..	....
White Cotton	49	" 1882	8	14.8	6	18.6
Cottonwood	50	" 1882	7	14.8	..	....
Colorado Pine	50	July, 1881	..	....	..	....

Some of the figures are the result of examinations by Mr. Chanute.

The same road has also kept records of Colorado pine ties treated at its own works at Las Vegas, N. M., and laid in special places, as follows:

No. of ties.	Date laid.	November, 1899. In track.	Years.	Jan. 1, 1901. In track.	Years.
178	Nov., 1885	..	....	111	15.1
145	" 1885	88	14.	11	15.1
156	" 1885	97	14.	97	15.1
		Jan. 1, 1901		Feb. 15, 1901	
305	9-17-1885	10	15.2	8	15.4

On the Chicago, Rock Island & Pacific the treated ties not having been stamped prior to 1895, the date of treatment of ties renewed could not be ascertained, but an analysis of all the yearly reports indicates the following as the probable average life of treated ties east of the Missouri River on the company's lines, say 1,713 miles:

	Renewed, per cent.	In track, per cent.
Hemlock and Tamarack ties, 6 years' exposure.	2	98
" " " " 7 " " .	5	93
" " " " 8 " " .	8	85
" " " " 9 " " .	12	73
" " " " 10 " " .	17	56
" " " " 11 " " .	20	36
" " " " 12 " " .	20	16
" " " " 13 " " .	16	0

The last percentage is assumed in order to compute the average life. This figures up 10.57 years, and the reports on the lines west of the Missouri River indicate an average life one year longer. Of one lot of 21,850 treated ties laid on this part of the line in 1885, of which special record has been kept, 1,610 ties (12 per cent.) were still in the track in 1900, after 15 years' exposure, but 1,664 came out in 1901.

As stated in the last report, the Southern Pacific Company has adopted from the beginning a system of records for treated ties much superior to that of any other road. It has compiled statements of renewals to June 30, 1901, from which a table has been computed into renewal percentages of the ties originally treated and laid each year. (See Table). On this line, much as on the Atchison, Topeka & Santa Fe, the best results have been obtained upon the more arid regions. For the whole road the average life of the ties treated in 1887 figures up 7.89 years, and those of 1888 average 9.73 years, but the subsequent years, except perhaps 1898, promise to make a much better showing. . . .

In a discussion of tie preservation by the French Society of Civil Engineers in July, 1901, it was stated by a member, who advocated straight creosoting, that he had made an examination during the preceding month of 17,375 sleepers treated with zinc-creosote by Rütgers and laid in 1888. Some 84 per cent. were yet in the track after 13 years' exposure, while of a lot treated by another contractor by the same process (nominally) no less than 50 per cent. were rotten after an exposure of six years. It is understood that one of the plants in the United States is about to experiment with the zinc-creosote process; having succeeded, after a year's delay, in procuring suitable tar-oil.

One tie-treating plant has been shut down, one has been moved, and two have been built in the United States during 1901. They now stand as follows:

Location.	Year built.	Owner.	Process.	Kind of wood.	No. Retorts.	Estim't'd capacity ties per annum.
Lowell, Mass.	1848	Locks & Canal Co.	Kyanizing	Various	2	30,000
Las Vegas, N. M.	1885	A., T. & S. Fe Ry.	Zinc-Chloride	Pine	3	500,000
Bellemont, Ariz.	1898	A., T. & S. Fe Ry.	"	"	2	350,000
Chicago, Ill.	1886	Chi. Tie Preserving Co.	Zinc-Tannin	Hemlock	4	500,000
Mt. Vernon, Ill.	1899	Chi. Tie Preserv'g Co.	"	Black oak	1	200,000
Somerville, Tex.	1897	Tex. Tie & Lumber Co.	"	Pine, etc.	6	2,000,000
Kalispell, Mont.	1901	Gt. Northern Ry.	"	Pine fir	4	1,200,000
Houston, Tex.	1891	So. Pacific Co.	Burnettizing	"	5	1,500,000
Greenville, Tex.	1901	Mo., Kan. & Tex. Ry.	Zinc-Tannin	Pine gum	3	900,000
Calif. and Oregon	1894	So. Pacific Co.	Burnettizing	Pine fir	2	1,000,000
Oakland, Cal.	1889	So. Pacific Co.	Creosoting	Pine, etc.	2	1,000,000
Sheridan, Wyo.	1899	C., B. & Q. Ry.	Burnettizing	"	2	500,000
Beaumont, Tex.	1897	Intl. Creo. & Cons. Co.	Various	"	1	500,000
Perth Amboy, N. J.	1890	U. S. Wood Preserv'g Co.	Creo. Resin	"	4	1,200,000
Brooklyn, N. Y.	1878	Eppinger & Russell	Creosoting	"	4	800,000
Norfolk, Va.	1896	Nor. Creosoting Co.	"	"	4	900,000
W. Pascagoula, La.	1876	L. & N. R. R.	"	"	2	400,000

Under the auspices of the United States Department of Agriculture an experiment has been inaugurated in 1901 to test the relative merits of different methods of treating ties of various kinds of timber. For this purpose certain railroads and individuals have given ties to a total of 5,850 ties, and perhaps more coming.

Of these some 4,900 have been treated gratis at Chicago, at Somerville, Texas, and at Beaumont, Texas, by the zinc-tannin, the zinc-chloride, the Allardyce and the Hasselmann processes; also with Beaumont petroleum and zinc-chloride, with carbolite and with Spirittine. The most noxious place which could be found has been

*Extracts from the Committee report to the American Railway Engineering and Maintenance-of-Way Association. March, 1902.

selected, about seventy-five miles east of Somerville, on the Montgomery Branch of the Gulf, Colorado & Santa Fe Railway in Texas, at a spot where unprepared pine ties generally decay in 12 to 14 months, and where, in consequence of the bad drainage, heavy rainfall and warm temperature ties treated with zinc-chloride have decayed in two to four years. The results are to be watched and reported upon year by year by the special agents of the Bureau of Forestry, Department of Agriculture. Messrs. Hermann von Schrenk and Gellert Alleman are the special agents who have managed the arrangement and the duly marking of these experimental ties with dating and identification nails. They have furnished a copy of the records thereof which has been filed with the Secretary of the Association for the benefit of its members who may wish to examine these ties. The results, of course, will be comparative only, and not absolute.

Prof. Hermann von Schrenk visited Europe in the summer of 1901 to investigate timber preservation and has made an elaborate report to the United States Department of Agriculture.

The choice at present lies between these various processes:

1. Creosoting—Injection of heavy tar-oil, rich in antiseptics.
2. Creo-resinate process—Creosote, resin and formaldehyde.
3. Water-creosote process—Emulsion of creosote and water.
4. Kyanizing—Injection of corrosive sublimate.
5. Burnettizing—Injection of chloride of zinc alone.
6. Zinc-tannin—Chloride of zinc, followed by glue and by tannin.
7. Zinc-creosote—Emulsion of chloride of zinc and creosote.
8. Allardyce process—Injection of chloride of zinc, followed by creosote.
9. Hasselmann process—Boiling in sulphates of iron, copper, etc.

LIFE RECORD OF TIES ON THE SOUTHERN PACIFIC COMPANY, ATLANTIC SYSTEM. DATA COMPLETED TO JULY 1, 1901.

Year.	Total number of cross ties of all kinds laid in tracks (inc. new tracks.)	Number of Cross Ties Removed from Tracks — 1893: Main and side.	1893: Main and side.	1893: Per cent.	1894: Main and side.	1894: Per cent.	1895: Main and side.	1895: Per cent.	1896: Main and side.	1896: Per cent.	1897: Main and side.	1897: Per cent.	1898: Main and side.	1898: Per cent.	1899: Main and side.	1899: Per cent.	1900: Main and side.	1900: Per cent.	1901: Main and side.	1901: Per cent.	Total removed. Main and side.	Total removed. Per cent.	Per cent. remaining in track on date of this report. Main and side.	Av'ge life in years deduced from renewals. Main and side.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1887..	4,144	472	11.39	1,020	24.61	1,156	27.90	1,401	33.81	95	2.29	.....	.....	.....	.....	.....	.....	.....	.....	4,144	100.00	.....	10
1888..	118,098	3,199	2.71	3,602	3.05	10,665	9.03	16,883	14.30	9,419	7.97	20,638	17.47	29,935	25.35	23,757	20.12	.....	.....	118,098	100.00	.....	12
1889..	196,365	528	.27	547	.28	3,337	1.70	5,545	2.82	3,867	1.97	12,517	6.37	17,487	8.91	28,580	14.55	68,322	34.79	140,730	71.66	28.34	12
1890..	212,677	69	.03	67	.03	940	.44	3,536	1.66	4,424	2.08	9,706	4.57	13,192	6.20	45,126	21.22	36,139	16.99	113,199	53.22	46.78	11
1891..	180,670	.....	.....	8	.....	185	.10	936	.52	1,035	.57	4,293	2.38	5,227	2.89	28,360	15.70	14,073	7.79	54,117	29.95	70.05	10
1892..	247,179	.....	.....	.....	.....	46	.02	336	.14	444	.18	3,845	1.56	3,790	1.53	10,981	4.43	10,871	4.40	30,313	12.26	87.74	9
1893..	179,229	.....	.....	.....	.....	269	.15	177	.09	120	.07	1,504	.84	1,023	.57	4,881	2.73	4,857	2.71	12,831	7.16	92.84	8
1894..	190,769	.....	.....	.....	.....	6	.....	18	.01	79	.04	493	.26	448	.24	3,938	2.06	1,688	.89	6,670	3.50	96.50	7
1895..	190,802	.....	.....	.....	.....	.....	.....	129	.07	1	....	110	.06	230	.12	1,350	.71	620	.32	2,440	1.28	98.72	6
1896..	165,783	.....	.....	.....	.....	.....	.....	.....	.....	1	....	165	.10	7	.....	1,367	.83	748	.45	2,288	1.38	98.62	5
1897..	86,737	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	46	.05	22	.03	308	.36	377	.44	99.56	..
1898..	152,329	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	.02	104	.07	529	.35	2,665	1.75	3,328	2.19	97.81	..
1899..	207,555	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	.02	274	.13	307	.15	99.85	..
1900..	342,335	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	420	.12	420	.12	99.88	..
1901..	292,493	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	627	.21	627	.21	99.79	..

Perhaps there will be data for more of the above and other new processes for future reports. Now that the American railroads are beginning to treat their ties we may expect a new crop of suggestions and processes. It may be well to experiment on a small scale with the more plausible of them, so that five or ten years hence we can judge of the probable results. Especially is this the case with petroleum, a home product, some varieties of which are now very cheap. It is not an antiseptic, but possibly may be rendered so by the addition of other substances. It is understood that the Russian chemists have been endeavoring to do so, but have not made a success as yet.

The tables of statistics accompanying the report are not reproduced. This report is signed by E. B. Cushing, E. M. W., Sou. Pac. Atl. Sys., Chairman; W. C. Cushing, Supt., Penna. Lines West, Vice-Chairman; O. Chanute, Consulting Engineer, Chicago, Ill.; W. W. Curtis, Consulting Engineer, Chicago, Ill.; J. B. Berry, Chief Engineer, Union Pacific R. R.; Wm. Archer, Prin. Asst. Eng., B. & O. S. W. R. R.; C. C. Mallard, Div. Eng., Southern Pacific Co.; E. E. Hart, Engineer, N. Y. C. & St. L. Ry., and J. C. Nelson, Roadmaster, A. G. S. R. R.

Rails.*

The Board of Direction asked that the report be confined to one or two of the subjects before us. In accordance with this recommendation, we stated that in our judgment two of the most important subjects to be reported on were rail sections and specifications. In naming specifications as an important subject, we had in mind, however, a specification that would cover the process of manufacture better than any specification now in general use.

Rail Sections.—The rail mills have furnished the percentages of their total output of rails rolled to A. S. C. E. Section, during 1901, as follows:

National Steel Co.	95.0 per cent.
Pennsylvania Steel Co.	93.2 per cent.
Illinois Steel Co.	70.0 per cent.
Cambria Steel Co.	73.5 per cent.
Carnegie Steel Co.	72.0 per cent.
Maryland Steel Co.	5.2 per cent.
Lackawanna Steel Co.	37.2 per cent.

The low percentage of A. S. C. E. output from the Maryland Steel Co. is explained by the fact that a large amount of rail of special pattern was rolled for export; also that the Pennsylvania Lines East of Pittsburgh and the Baltimore & Ohio used special patterns. The Lackawanna Steel Co. rolled a large tonnage of the Dudley pattern for the New York Central Lines.

We referred in 1901 to some difficulties which were encountered at the mills, due to finishing the rails at a lower temperature, and suggested that it might be necessary to modify the heavier sections in common use, especially the A. S. C. E. sections, which have come into wide use. The difficulties still exist, and in our opinion sooner or later some changes will have to be made, either in sections, or in the mill practice in rolling. It was suggested at our last meeting that the sections should not be changed without taking up the matter with the American Society of Civil Engineers, and since that time that society has decided on the appointment of a committee on rail sections, which should summarize the present state of the art of rail-making and cover an investigation of all questions relating thereto, whether of sections, composition of the material or process of manufacture. The personnel of this committee has not been announced. It is hoped that it will be made up of men directly connected with the use of rails; also, that a long time will not be necessary to reach conclusions and formulate a report. We should co-operate in every possible way and freely furnish any information we can in the matter.

We are fully aware of the number of committees that have been appointed from time to time to report on the chemical composition of steel, the methods of rolling to make a first-class steel rail, and that there has been a great deal of time and work expended on this matter by these committees. Some of the reports have gone into the subject very fully, and at the conclusion have recommended that the metal should receive more work at the proper low temperature. This recommendation has not been adopted by railroad companies because the mills have asked a higher price per ton for the rail; instead, they have continued to buy rails of poor quality, and often without any tests or inspections whatever being made. We think we fully appreciate that in asking the manufacturers to improve their methods of rolling and give more care and attention to the manufacture of rails that the railroad companies should be willing to share in any additional expense if such be necessary. The manufacturers now know very well what is necessary to give better wearing rails, and should be able to give an estimate of the additional cost per ton on account of changed methods in manufacture. We know there is no use in trying to make a good rail by the chemical composition alone. The evidence clearly points to the fact that much better rails can be made from the steel now in use, provided it receives the proper treatment in rolling. We desire, therefore, to put ourselves clearly on record on this point, as it is a vital one and underlies the whole matter.

Specifications.—We strongly advocate the use of a uniform specification and uniform methods of testing. In our last report we submitted for the information of the Association the proposed standard specifications recommended by Committee No. 1 of the American Section of the International Association for Testing Materials, which have since been adopted by the American Section, at their annual meeting in June, 1901. We now offer these specifications, with some amendments, for discussion and use by the members of this Association. These specifications are not entirely satisfactory to us, but in order to take a step toward uniformity we advise their use instead of waiting for a perfect specification. Any additions or modifications needed which may develop from an actual test may be made as necessary.

It is conceded that the quality of rolled steel depends on its chemical composition and the heat treatment it receives in connection with the work of rolling, and in order to get the best results, steel of good uniform chemical composition should be used and rolled at a uniform low temperature, the ingot or bloom used being large enough to allow the work in rolling to break up the coarse grain, as it is not the total amount of reduction in rolling that produces the best results, but a sufficient amount of work must be done at the proper low temperature—the work at the higher temperatures merely changing the form of the mass without changing its structure. The present practice in each mill is to use the same size bloom for all weights of rail, different mills having different size blooms. We do not advise different sizes of blooms for different weight of rails, but we are of the opinion that a larger bloom should be used than at present for heavier patterns of rail.

The bad effects of too high finishing temperature are fully recognized by the rail manufacturers, some of whom are now rolling their heavier rails at a much lower temperature than formerly. We appreciate their efforts, and, as showing that the engineers were willing to meet the manufacturers half way, a change in the section of the heavier rails was suggested last year by increasing the thickness of metal in the flanges in order to carry the heat longer and allow the work of rolling on the head at the proper low temperature, provided the manufacturers found it necessary to make this change in order to produce the best results. There is no use advocating any change of section or method of rolling unless we can have some reliable check that the rails are being rolled at the proper low temperature. At our last meeting it was suggested that the amount of shrinkage in the rail, after it has been cut at the hot saw, is the best and easiest method of checking the finishing temperature.

We note that the Pennsylvania Railroad Company, in its new rail specifications (October 1st, 1900), has embodied this shrinkage clause for a 30-ft. rail, which we give below, modifying it for a 33-ft. rail, which is our standard: "The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws of 6 in. for 85 lb. and 6⅛ in. for 100-lb. rails, and no artificial means of cooling the rails shall be used between the finishing pass and hot saws."

The new rail specification of the Pennsylvania Railroad is as follows: The steel of which the rails are rolled shall contain not less than 0.40, nor more than 0.55, of 1.00 per cent. of carbon where the phosphorus exceeds 0.07 of 1.00 per cent. Where the phosphorus is .07 of 1.00 per cent. or less, the carbon shall not be less than 0.45, nor more than 0.60, of 1.00 per cent. The manganese in no case shall exceed 1.20 per cent., and where the phosphorus exceeds 0.07 of 1.00 per cent., the manganese shall not be higher than 1.00 per cent. Also in no case shall the phosphorus exceed 0.10 of 1.00 per cent.

It will be noticed that the carbon and manganese are decreased when the phosphorus is above seven-hundredths of one per cent., in order to give steel of an equivalent hardness, and at the same time to guard against the steel being too hard and brittle. We are advised that the Pennsylvania Railroad now advocates higher carbons, as its drop tests show that rails finished at a lower temperature give a greater deflection than formerly, when finished at the higher temperature. It also finds that higher carbons can be used with safety when the proper check is kept on the low-finishing temperature. They specify a deflection of not more than 2¾ in. for 100 lb. rails after the first blow. We suggest that our members direct their rail inspectors to keep a record of the amount of shrinkage, with the results of drop tests and chemical composition of each lot of rails they receive. This information, with the results of the rails in service, will be valuable in making a final specification.

The specifying of a drop test seems to be almost universally regarded as essential, and yet, unless the portion of the ingot from which the test piece comes is known, the drop test may be quite misleading. The test piece should be taken from some designated location, preferably from what was the top of the ingot, for then we are reasonably sure that all the rails represented by that test

*Extracts from the Report of the Committee of the American Railway Engineering and Maintenance-of-Way Association. March, 1902.

piece are at least equal to, and probably better, than the test piece.

It is recommended that the following simple test be made by those interested in the wear of rails of different compositions and manufacture: Take a curve where rails are known to wear rapidly, and lay the different kinds of rail alternately. The rails are then acting under precisely uniform conditions, and it will take but a few months to determine what rail is giving the best results. If this experiment be made anew each year for a few years, the road making such a test would have valuable information, which will be useful in helping to decide on the kind of rail which will give the best results in actual service.

PROPOSED STANDARD SPECIFICATIONS FOR STEEL RAILS.

PROCESS OF MANUFACTURE.

1. (*a*). Steel may be made by the Bessemer or open-hearth process.

(*b*). The entire process of manufacture and testing shall be in accordance with the best standard current practice, and special care shall be taken to conform to the following instructions:

(*c*). Ingots shall be kept in a vertical position in pit heating furnaces.

(*d*). No bled ingots shall be used.

(*e*). Sufficient material shall be discarded from the top of the ingots to insure sound rails.

CHEMICAL PROPERTIES.

2. Rails of the various weights per yard specified below shall conform to the following limits in chemical composition:

	50 to 59+ lbs. Per cent.	60 to 69+ lbs. Per cent.	70 to 79+ lbs. Per cent.	80 to 89+ lbs. Per cent.	90 to 100 lbs. Per cent.
Carbon	0.35-0.45	0.38-0.48	0.40-0.50	0.43-0.53	0.45-0.55
Phosphorus shall not exceed ..	0.10	0.10	0.10	0.10	0.10
Silicon shall not exceed ..	0.20	0.20	0.20	0.20	0.20
Manganese.	0.70-1.00	0.70-1.00	0.75-1.05	0.80-1.10	0.80-1.10

(See extract from P. R. R. specifications.)

PHYSICAL PROPERTIES.

3. One drop test shall be made on a piece of rail not more than 6 ft. long, selected from every fifth blow of steel. The test piece shall be taken from the top of the ingot. The rail shall be placed head upwards on the supports and the various sections shall be subjected to the following impact tests:

Weight of rail. Pounds per yard.			Height of drop. Feet.
45	to and including	55.....	15
More than 55	"	65.....	16
" 65	"	75.....	17
" 75	"	85.....	18
" 85	"	100.....	19

If any rail break when subjected to the drop test, two additional tests will be made of other rails from the same blow of steel, and if either of these latter tests fail, all the rails of the blow which they represent will be rejected, but if both of these additional test pieces meet the requirements, all the rails of the blow which they represent will be accepted. If the rails from the tested blow shall be rejected for failure to meet the requirements of the drop test, as above specified, two other rails will be subjected to the same tests, one from the blow next preceding and one from the blow next succeeding, the rejected blow. In case the first test taken from the preceding or succeeding blow shall fail, two additional tests shall be taken from the same blow of steel, the acceptance or rejection of which shall also be determined as specified above, and if the rails of the preceding or succeeding blow shall be rejected, similar tests may be taken from the previous or following blows, as the case may be, until the entire group of five blows is tested, if necessary. The acceptance or rejection of all rails from any blow will depend upon the result of the tests thereof.

HEAT TREATMENT.

The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws of 6 in. for 85-lb. and 6⅛ in. for 100-lb. rails, and no artificial means of cooling the rails shall be used between the finishing pass and the hot saws.

TEST PIECES AND METHODS OF TESTING.

4. The drop test machine shall have a tup of 2,000 lbs. weight, the striking face of which shall have a radius of not more than 5 in., and the test rail shall be placed head upwards on solid supports 3 ft. apart. The anvil block shall weigh at least 20,000 lbs., and the supports shall be a part of, or firmly secured to, the anvil.

5. The manufacturer shall furnish the inspector, daily, with carbon determinations of each blow, and a complete chemical analysis every 24 hours, representing the average of the other elements contained in the steel. These analyses shall be made on drillings taken from a small test ingot.

FINISH.

6. Unless otherwise specified, the section of rail shall be the American Standard, recommended by the American Society of Civil Engineers, and shall conform, as accurately as possible, to the templet furnished by the railroad company, consistent with paragraph No. 7, relative to specified weight. A variation in height of $^1/_{64}$ in. less and $^1/_{32}$ in. greater than the specified height will be permitted. A perfect fit of the splice bars, however, shall be maintained at all times.

7. The weight of the rails shall be maintained as nearly as possible, after complying with paragraph No. 6, to that specified in contract. A variation of one-half of one per cent. for an entire order will be allowed. Rails shall be accepted and paid for according to actual weights.

8. The standard length of rails shall be 33 ft. Ten per cent. of the entire order will be accepted in shorter lengths, varying by even feet down to 27 ft. A variation of ¼ in. in length from that specified will be allowed.

9. Circular holes for splice bars shall be drilled in accordance with the specifications of the purchaser. The holes shall accurately conform to the drawing and dimensions furnished in every respect, and must be free from burrs.

10. Rails shall be straightened while cold, smooth on head, sawed square at ends, and, prior to shipment, shall have the burr, occasioned by the saw cutting, removed, and the ends made clean. Number 1 rails shall be free from injurious defects and flaws of all kinds.

BRANDING.

11. The name of the maker, the month and year of manufacture shall be rolled in raised letters on the side of the web, and the number of the blow shall be stamped on each rail.

INSPECTION.

12. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture, prior to shipment.

NO. 2 RAILS.

13. Rails that possess any injurious physical defects, or which for any other cause are not suitable for first quality, or number 1, rails, shall be considered as number 2 rails, provided, however, that rails which contain any physical defects which seriously impair their strength shall be rejected. The ends of all number 2 rails shall be painted in order to distinguish them.

We recommend that the above specification be adopted as standard for use of members of this Association and that the members of the Association obtain the information suggested in regard to chemical composition and shrinkage, and submit the same for use of the Committee from time to time, as it is secured.

This report is signed by R. Trimble, Pennsylvania Lines, Chairman; J. T. Richards, Pennsylvania R. R., Vice-Chairman; Thomas Purcell, Mexican National; A. W. Johnston, N. Y. C. & St. L.; C. E. Wickham, C. R. I. & P.; R. W. Hunt, Chicago; G. B. Woodworth, C., M. & St. P.; F. E. Abbott, Chicago; Wm. R. Webster, Philadelphia, Pa.; W. T. Manning, B. & O., and H. Pierce, C. & O.

Bessemer Ingots and Rails in the United States in 1901.

The American Iron and Steel Association gives statistics of the production of Bessemer steel ingots and castings in the United States in 1901; also of the production of Bessemer rails by the producers of Bessemer steel ingots. The ingot statistics include a few thousand tons of Bessemer steel castings. The total production of ingots was 8,713,302 gross tons, against 6,684,770 tons in 1900, an increase of 2,028,532 tons, over 30 per cent. The production of 1901 was by far the largest in our history.

The production of all kinds of Bessemer rails by the producers of Bessemer steel ingots in 1901 was 2,836,273 gross tons, against 2,361,921 tons in 1900, and 2,240,767 tons in 1899. The maximum production of Bessemer rails by the producers of Bessemer steel ingots was reached in 1901. The year of next largest production was 1900, which was closely followed by its predecessor, 1899. In 1887, fourteen years ago, 2,044,819 tons were made. This was the fourth year of largest production. The production of Bessemer rails weighing 45 pounds and less than 85 pounds to the yard are separated from those weighing less than 45 pounds and over 85 pounds. The figures for 1901 are:

States—Rails.	Under 45 lbs. Gross tons.	45 lbs. and less than 85. Gross tons.	85 lbs. and over. Gross tons.	Total. Gross tons.
Pennsylvania ..	80,001	1,095,279	230,728	1,406,008
Other States ...	60,213	1,106,958	263,094	1,430,265
Total for 1901	140,214	2,202,237	493,822	2,836,273
Total for 1900	154,796	1,605,067	602,058	2,361,921

There was a considerable decline in 1901 in the production of rails weighing 85 lbs. and over as compared with 1900. The total production of rails in 1901 will include rails made from open-hearth steel and iron rails. When all the figures are collected it will probably be found that the total production of all kinds of rails in 1901 was about 2,875,000 tons.

Great Britain's largest annual production of Bessemer steel rails was in 1882, when she made 1,235,785 tons. In 1901 we more than doubled her best year's work.—*The Bulletin.*

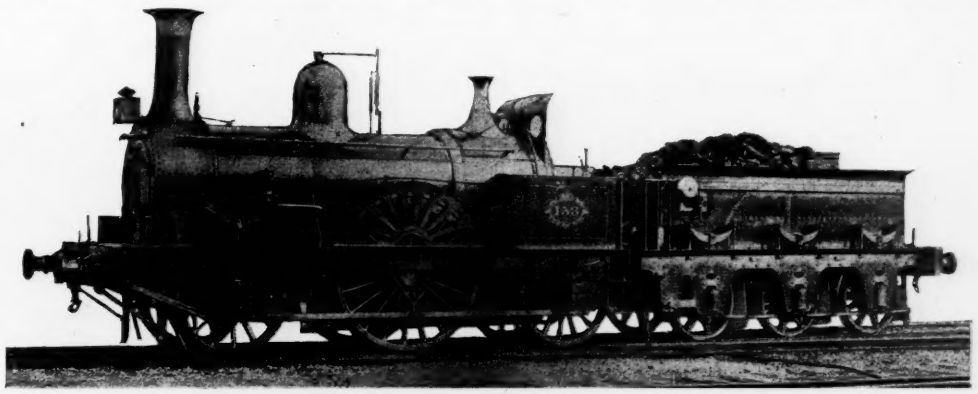
Diamond Jubilee of the Brighton Railway.

There occurred recently the 60th anniversary of the opening throughout of the Brighton Railway, than which few lines in Great Britain are better known to Americans. The first scheme for a railway between London and Brighton was got up in January, 1825, in the shape of the Surrey, Sussex & Hants Railroad Company. Lewes, Shoreham and even Portsmouth were included, the idea being to join the Croydon, Merstham & Godstone Iron Railway at Merstham, and so pass to London over the old tram roads described in the *Railroad Gazette* of August 23, 1901. Although travelers were promised "increased expedition and security," the carriage of goods, coal and fish seems to have been the chief object. The company were willing to use locomotives if they could be made to answer its purposes, but as the point was then open to doubt, would have used horses instead. The younger John Rennie was engineer. The company speedily passed into oblivion without effecting anything.

Towards the end of 1832 notice was given of intention to apply to Parliament for an act to make a railway from Brighton to near St. Mark's Church, Kennington, a South London suburb, but failure once more resulted. A scheme of 1834, called the Grand Southern Railway, also came to nothing, but about two years later railway speculations became very popular and quite a little crowd of Brighton lines was projected. These fought and squabbled so furiously that the Parliamentary Committee-room in which their cases were heard was called "the railway cess-pool." The House of Commons felt it necessary to appoint an independent engineer to decide which was the best plan. Captain Robert Alderson, of the Royal Engineers, reported, on June 27, 1837, in favor of what was called the "direct" line, and on July 15, the same year, the London & Brighton Railway Company's bill received the royal assent. It was, however, only for a line about 42 miles in length, from the London & Croydon Railway, near Croydon, to Brighton. Running powers over the Croydon and Greenwich lines, both of which were already open, were obtained up to London Bridge Station.

The "direct" line was undoubtedly the best for public convenience, but it was a formidable undertaking, with huge chalk cuttings, a large viaduct over the Ouse Valley and some 3¼ miles of tunnels. People were then dreadfully afraid of tunnels and the three principal ones—Merstham, Balcombe and Clayton—were all lighted with gas jets along the sides. Remains of the gasworks existed till very recently, but they were not long in use.

On July 12, 1841, the railway was opened from what is now Norwood Junction to Hayward's Heath, 29 miles, the remaining 13 to Brighton being opened on Sept. 21. A service of six trains each way on week-days was put on, the fastest making the run of 50½ miles in 105 minutes. Apparently the line was not considered safe after dark, the latest train being the 4.45 down express. There was an up express at 8.30 a. m., these trains and two each way which took two hours being first class only. The remaining three trains were first and second; third-class passengers were not taken.



A Brighton Locomotive of 1862.

The original engines were mostly small 6-wheeled "singles," but a few of Bury's 4-wheelers were also used. On Oct. 2, 1841, the 10.45 down fast was worked by a 6-wheeler with a Bury in front, when the latter left the rails near Hayward's Heath and caused a very bad smash which led the directors to give notice that they would use 4-wheeled engines no longer and would have a luggage van next the tender. A pair of trailing wheels was added to the Bury's.

The main line is not the oldest part of the system, the line between Brighton and Shoreham, 5¾ miles, having been opened on May 12, 1840. On this the company trained their staff for the main line.

The line into Victoria, the West-end terminus in London, was only opened in 1860, and has been the making of the line. Some of the trains join or are separated from the London Bridge portions at East Croydon; others run independently throughout. The present title of London, Brighton & South Coast Railway was assumed by act of July 27, 1846, on the amalgamation of the London & Brighton with the London & Croydon Company.

The accompanying photograph represents an express engine built at Brighton Works in 1862, from the designs

of Mr. J. C. Craven, Locomotive Superintendent. The driving wheels are 78 in. and the carrying wheels 51 in. in diameter; cylinders, 16 x 20; heating surface of 180 brass tubes, 990 sq. ft.; of fire-box, 92 ft.; or 1,082 ft. in all. It weighed 28 tons 12 cwt. full, and was broken up in December, 1891. W. B. PALEY.

London, November, 1901.

Control of Trains Parted Between Air-Brake Cars.

BY E. W. PRATT.*

Automatic block signals occasionally become deranged, in which event they stand at "normal" or "stop" position, and necessarily cause frequent delay to passing trains until they are repaired. Should we change the wiring of these signals so that they would show "clear" when out of order, and claim that thereby the delay to passing trains would be avoided, I doubt very much if the railroad world would accept the idea. Although a large majority of railroad officers are unacquainted with the details of the automatic air-brake, yet the principles upon which it is based should certainly be quite familiar to them, as the fundamentals of signaling, especially so as the various improvements inaugurated and the reasons therefor have recently been live subjects. The modern device known as the automatic air-brake is the result of great thought and careful experiment; none of its functions should be perverted without careful inquiry and intelligent consideration.

During the early stages of equipping with quick action brake, when it frequently happened that there were but one or two air-brake freight cars next to the engine, and as a consequence, quick-action was likely to occur when service application was intended, several railroad companies prevented the possibility of quick-action by drilling a hole through the emergency piston of each triple valve. This action was taken to temporarily meet a contingency, and later these holes were plugged when a reasonable proportion of air-brake cars had been acquired; nor would they be justified to-day in destroying the quick-action feature in all modern triple valves in order to prevent a disagreeable jar or lurch in very exceptional cases; for now we still frequently have an engine with but one or two cars with air connected while switching.

One of the strongest claims of superiority of the automatic air-brake over the vacuum or the straight air-brake, is that a train so equipped will be stopped in the shortest possible distance when the train parts or the train line becomes deranged, as by a burst hose, broken train pipe, etc. Hence, when we read that a special device has been invented, patented, and tested by "prominent officials," whereby when a train parts the rear portion will stop gradually while the head portion will be under the entire control of the engineer, would it not be well to consider the device in its practical application in order to ascertain if we be not jumping from a cool frying pan into a rather hot fire?

Having conducted not a few tests with experimental apparatus I am aware that under the conditions of a test and with all participants thoroughly alert, many seemingly beneficial results are obtained. Take, for example, a train composed of 70 empty cars, 51 equipped with air-brakes and in use. I can easily imagine the shock if such a train parted suddenly 50 cars from the head end, especially so with a powerful locomotive working hard and perhaps equipped with an independent driver brake because some bright genius in the mechanical department of the road invented it and insists on its value. In such a case I have seen from one to three drawbars pulled out. *But the train stops*, and you do not have to *guess* where the "hind end" is.

Suppose in the above case the proposed new device is in use. How will the engineman know that his train has parted? His pump might automatically supply the leakage and he run some distance before knowing that his train has parted. Then what will he do? He does not know whether or not the rear portion is with or without air cars, nor whether it has stopped or is still coming. When is it safe for him to stop?

How is it with the rear portion? Without any shock the men in the caboose might not know the train had parted, and hence fail to assist in stopping it, as would be necessary on a descending grade.

Assume a passenger train equipped with this device for preventing shocks. If the conductor should pull the conductor's valve in a car, wishing to stop at once, with the device working as intended and not already out of order from dirt, scale and rust, only the car in which the conductor might be would set hard and quick. The cars to the rear would gradually apply while the forward cars would not set at all unless the engineman chose. Imagine the results of conductor's valve pulled in the last car of a long passenger train. If only the rear car set in emergency and the forward cars did not apply until the engineman wished, would not a severe jerk be caused, and probably a drawbar be pulled out?

In a freight train, suppose a car truck jumps the track and the hose or train pipe is broken, is it advisable to leave it discretionary with the engineman whether or not he shall stop at once?

I admit that all the resulting damage, as suggested in the above queries, is liable to occur where trains part between cars not equipped with automatic brakes, and for that reason I have always advocated the rapid equipment of every car—no matter for what local purpose it is used—with air-brakes, and the use of the same in every train. I make so bold as to claim that it would be economy from a switching standpoint alone for a railroad with three-fourths of its cars so equipped to apply *brakes* (not *pipes*) to the remaining fourth. I do not believe in piping cars even though the life of the cars is but a few years, for the air-brake apparatus need not be destroyed with the car. If these old cars are too weak to place in the head of the train with other air-braked cars, this fact should condemn them from service anywhere else in the train.

The writer has spent not a little time in the past ten years in the careful investigation of trains parting and the best means of preventing the same, and believes the only wise conclusion is that all cars should be equipped with automatic brakes, and enginemen carefully instructed in handling long trains.

To show the value of a special test, it is impossible to refrain from relating the experience obtained from a test made on a Western road a few years ago. The question arose as to the efficiency of the flagging rule—was twenty-four telegraph poles sufficient distance in which to stop a train under all conditions? The test train consisted of fifty loaded box cars, all air-braked. Three flagmen were stationed along the road at various points. The first flag was answered by the engineman applying the brakes of the entire train in quick action or "emergency application," as it is called. Next, the train proceeded with only the head ten air cars coupled up. Upon a sudden flag, the engineman called for brakes, used what air-brakes he had, and with the assistance of hand brakes in the rear, a good stop was made. Following this, the train proceeded without any air-brakes in use except those on the locomotive and tender. On the engineman's call for brakes, the steam from the whistle was hardly visible before not only the head brakeman but the conductor and rear brakeman were "on top and hard after them."

All stopping distances were satisfactorily short, and the officers, except one, were seated in the caboose cupola inwardly congratulating themselves, and outwardly swapping railroad yarns. The remaining officer went over to the "head end," where, ten miles further on, he called for brakes for a space of four miles, and yet no one behind either heard or responded! The whistle was a good one, too.

The natural conclusion was that trains fully equipped with air-brakes, then tested and known to be under the control of the engineman was a little the surest thing after all. In what way the result of the day's test was valuable, the reader can well imagine.

Mason City, Iowa, March 6.

*Master Mechanic, Chicago & North Western Railway.

The Value of Up-to-Date Tools in Railroad Shops.*

In a railroad shop employing about 160 machinists there were no horizontal boring machines. Such work had to be done in lathes, milling machines or drill presses. Permission was obtained to order a No. 2½ horizontal boring and drilling machine with 4-in. bar and latest attachments. It has been in use about 18 months and shows earnings by money saved as follows:

Original cost of machine installed ready for work	$1,696
Average saving per year as compared with old methods	900
Interest on investment, per cent	53

It formerly required three hours to bore a driving box brass for a 9 x 12-in. journal in a milling machine and about four hours to do the same work in a lathe, whereas they are now bored in one hour in the horizontal boring machine. Rocker boxes, tumbling-shaft boxes, etc., are done in one-half the time formerly used. In boring air-pump cylinders it was formerly necessary to take the pump apart and set and bore each cylinder separately, requiring from two to three hours each. In the new machine it is possible to bore all four cylinders of a New York pump at one setting, without taking them apart, and requires but an average of one hour for each cylinder, and there is much greater accuracy. This machine does double the work of the old ones, thereby saving the wages of one machinist at $900 per year.

An old car wheel borer was replaced by a new 42-in. borer with hub-facing attachment, power crane for handling wheels, etc., which cost installed, $1,710.90. This saves $735 a year, which amounts to 42½ per cent. on the investment.

A new heavy double-head car-axle lathe, costing $1,665 installed, saves about $250 a year, or 15 per cent. on the principal.

Most engine lathes of modern design compared with those built 20 or 25 years ago, turn out from 20 to 30 per cent. more work, saving from 15 to 35 per cent. interest on the investment. Recent planers are built 30 to 50 per cent. heavier than they were 20 years ago, with greater power and quicker return, the latter running as high as 72 to 80 ft. per minute as compared with 40 ft. or less for the older machines. They are also fitted with three or four tool heads, whereas the old planers had only one or two at most. This means an increase of 25 to 50 per cent. in the amount of work done, or earnings of 10 to 25 per cent. on the amount expended for the machine. The various types of turret lathes for making bolts, studs and pins from bar iron are well adapted to locomotive work and will easily turn out twice or three times as much of this class of work as will an ordinary old style engine lathe. Such machines cost $1,600 to $1,800, and make a return of from 50 to 60 per cent. in savings. The large automatic turret lathes for turning piston heads, cylinder packing, bull rings, balanced-valve rings, etc., will do double the amount of this work that an engine-lathe will, and the same may be said of the latest boring and turning mills. As a rule, improved small tools will earn a larger rate of interest on the investment than larger and more expensive ones.

There are very few railroads to-day which have not more or less pneumatic drills, hammers, riveters, hoists, etc., and no argument should be necessary to demonstrate their earning capacity, but the value of air jacks for cars and locomotives is not so generally known. It formerly required about four hours for eight men with screw-jacks to take a ten-wheel engine weighing 132,000 pounds off its drivers, at a cost of $5.14, and about one-half that time for four men to do the same work with hydraulic jacks; but using four pneumatic jacks, it is now regularly done by four men in one hour at a cost of 66 cents. However, to be strictly up-to-date an electric crane should be used and the time reduced to ten minutes.

A pneumatic ram was recently made at a cost of $168.55 for breaking staybolts to remove worn out fire-boxes, which earns very large interest on the investment. It formerly cost $45.60 to cut out the crown bolts and staybolts of a ten-wheel locomotive with 9-ft. fire-box, using three men, but with the pneumatic ram it is done by two men for $15.20, thereby saving $30.40 on each fire-box. If only one fire-box were removed each year this tool would earn 18 per cent. on the investment, but as this shop applies 30 new fire-boxes a year, the saving amounts to $912, or 541 per cent. per annum on the amount invested.

Recent designs of planers, tenoners, moulding and mortising machines are much heavier and more powerful and will do from 25 to 50 per cent. more work than old machines. The hollow chisel mortiser is an ingenious and very profitable tool for any shop, and the four and six-spindle boring machines are great labor savers. Wood trimmers are most valuable additions to the equipment of cabinet or pattern shops, and the new pattern and core-box machines will easily earn 100 per cent. on their cost if used one hour a day.

In figuring the earnings of the up-to-date tools in the above examples only average results have been taken and not special cases of unusual saving. No credit has been allowed for the scrap value of old machinery thrown out, nor have we considered the saving in shop room due to the use of more efficient tools; and last, but not of least importance in railroad work, in the reduction in the number of days locomotives must be held out of service for repairs, which will follow the use of up-to-date machinery. In a certain shop which makes general repairs to about 160 locomotives a year the average length of time required to put each engine through the shop was reduced from 34 days in 1898 to 30 days in 1900. This represents a saving of 640 days for one locomotive which, at a rental value of $10 a day, gives $6,400. As this was done with the addition of only a few new machines in a shop full of old and worn out tools, many of which had been in service from 25 to 35 years, it will be readily understood how much greater saving could have been effected had the shop been fully equipped with up-to-date machinery.

*Extracts from a paper presented by Mr. M. K. Barnum, Master Mechanic of the Union Pacific, before the March meeting of the Western Railway Club.

The Signals in the Fourth Avenue Tunnel.

The Miller Signal Company, of Chicago, whose apparatus was described in the *Railroad Gazette* of February 21, is equipping some or all of the tracks in the Fourth Avenue Tunnel, New York City, with apparatus for using its locomotive cab signal; and 12 locomotives of the New York Central are being fitted with the signaling apparatus. Electric circuits are already in use on the tracks in the tunnel, in connection with the manual signals now used, and we understand that the Miller signal is to be used without interfering with the present signals.

For those disk and lamp signals in the tunnel, which are between the inner tracks, and which therefore can be only about two feet high, new lamps are being tried, which are considerably more powerful than those heretofore used. The increase in power is secured by using Belgian burners, with round wicks. The lamps in these low signals were the ones which were criticised by Capt. Folger at the time of the railroad commissioners' investigation. The new lamps, while more powerful than the old, still remain less powerful than those in the signals on the fireman's side of these tracks. For these latter there is more room and larger signals are used.

The electric slot arrangement by which the signal lamps (on both sides of the track) were automatically turned, on their vertical spindles, to the stop position, on the passage of each engine, has been abandoned. This abandonment has made it possible to use the larger lamps on the low signals, as, now, the movement to the stop position is not made until after the train has passed.

Duplicate torpedo instruments have been put in at the home signals.

The track circuit locks, by which the home signals are held in the stop position, regardless of the action of the signalman, are being arranged with long overlaps. When the signals were put in, each overlap was 100 ft.; each home signal was held at "stop" until the train passed out of the block section controlled by that signal, and 100 ft. farther. The 100 ft. overlap will now be made 800 ft. This arrangement virtually provides two distant signals, and keeps trains 800 ft. farther apart than heretofore. To get all of its signals clear, a train must now keep about 6,000 ft. behind the one which precedes it (block section, 3,300 to 3,800 ft.; distant signal about 1,200 ft.; overlap about 800 ft.; distance in which to see the distant signal, about 500 ft.)

New Shops of the Ft. Worth & Denver City Ry.

New repair shops are now building by the Fort Worth & Denver City Ry. at Childress, Texas, which are expected to be finished by next February. The shops are necessarily small. The road is about 450 miles long and has about 40 locomotives, 30 passenger cars and 1,200 freight and miscellaneous cars. Originally, it was divided into three divisions, the divisons being Fort Worth to Wichita Falls, 114 miles; Wichita Falls to Clarendon, 163 miles, and Clarendon to Texline, 175 miles. The main shops, which were not very extensive, were at Fort Worth and small repair shops were maintained at Wichita Falls and Clarendon. With the increasing traffic the divisions were found too long and hence the road was divided into four divisions, making the division points Wichita Falls, Childress and Amarillo. This makes the divisions in order from Fort Worth, 114 miles, 105 miles, 116 miles and 117 miles respectively. The new shops were then located at Childress, near the middle of the road, and when these are completed the shops at former division points will be abandoned.

The general plan is shown by Fig. 1, and it will be seen that provision is made for future extension as indicated by dotted lines. This involves carrying the lead track further to the north and installing a transfer table. Then the building now used as a wood mill and paint shop will be changed to a boiler and blacksmith shop, using the space of the present machine, boiler and blacksmith shops for a machinery erecting shop. A new building to the north will then be built for use as a paint and car shop and wood mill. In addition to the shop buildings and roundhouse shown in full lines in Fig. 1, a small yard is being put in and a club house built for the employees.

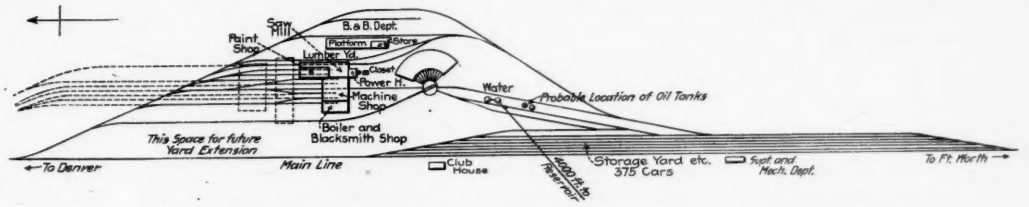
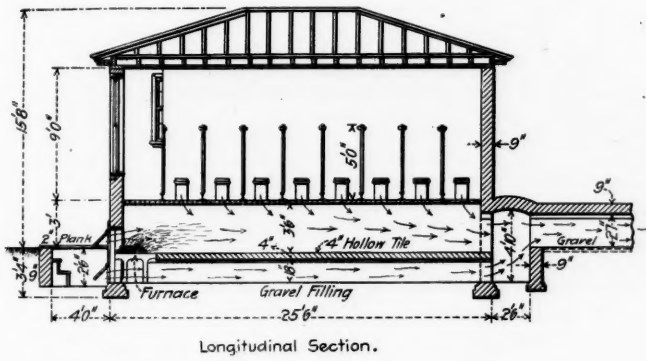
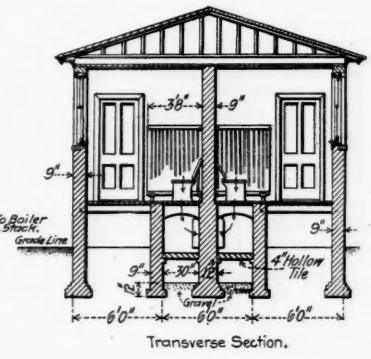


Fig. 1.—New Repair Shops at Childress, Texas—Fort Worth & Denver City Ry.

The buildings are brick with stone trimmings. The ground plan of the main building, Fig. 2, shows the size of the several departments and the arrangement of the tools, nearly all of which were bought before the new shop was planned.

Power for the shops will be furnished by one 125-h.p. engine driving a main line shaft. In addition to this there will be one small 30-h.p. engine belted to a 20-k.w. generator, and one 20-k.w. generator will be belted to the main line shaft. These generators will be run at 700 revolutions a minute and 250 volts. The generator driven by the small engine will be run at night and furnish current for lighting. The generator belted to the main shaft will be used in the daytime and furnish current for pumping water, although the switchboard is so arranged that either generator can be run in case of one failing. While it was desired to drive the shop tools by electric motors, it was deemed inadvisable on account of the small size of the plant and because the machinery was purchased before the shops were planned and considerable expense would have been necessary to make the change.





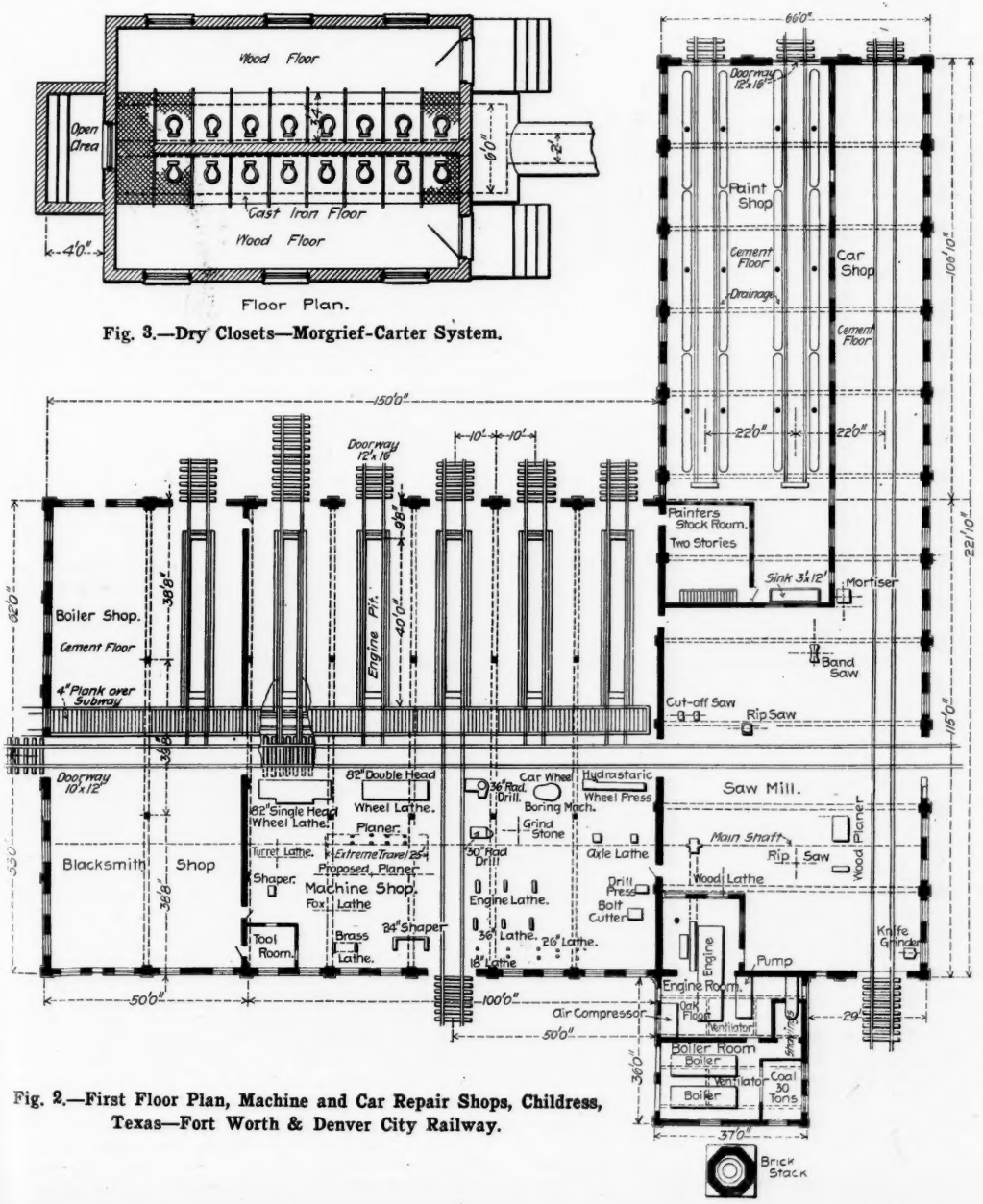


Fig. 3.—Dry Closets—Morgrief-Carter System.

Fig. 2.—First Floor Plan, Machine and Car Repair Shops, Childress, Texas—Fort Worth & Denver City Railway.

One of the interesting features of these shops is its water supply. Childress is located in the Gypsum Belt and good water is scarce. For the new shops, water will be obtained from a small reservoir holding 12,000,000 gals., situated about one mile from the power house. This reservoir is being increased to a capacity of 50,000,000 gals., by building a dam 20 ft. high. This is all surface water and the supply depends upon the rainfall. It is estimated that the reservoir will hold sufficient water to run the shops for six months without any rain. Outside of its being slightly muddy, the water is of very good quality. A 6-in. pipe line is laid between the reservoir and the shops and water is pumped into the shop tanks by a Worthington pump of 200-gals. capacity and 110-ft. lift, driven by a 15-h.p. electric motor. The pressure through the shops is obtained by another pump in the power house.

Another interesting feature is the use of fuel oil instead of coal. The intention is not only to use oil for the stationary boilers, but also for all the locomotives; therefore, no coal chutes or cinder pits are being built. Another feature of the shops is one taken from the Marshall shops of the Texas & Pacific and shown by Fig. 3. This is the dry closet which is necessary on account of the lack of a proper sewerage and drainage system. The details of this closet are clearly shown by the engravings.

In laying out these shops, Mr. H. W. Cowan, Chief Engineer of the Colorado & Southern, acted as consulting engineer and Mr. C. B. Martin of his office did the architectural work. In making the general plans and arrangement of machinery, Mr. Cowan was assisted by Mr. W. R. Scott, General Superintendent of the Fort Worth & Denver City.

Discussion of Vision and Color Sense at the Western Railway Club.

The address of Dr. Chas. H. Williams, of Boston, before the Western Railway Club at Chicago, February 18, on the above named subject, was reported in the *Railroad Gazette* of Feb. 28, p. 144.

In the discussion on the paper, Mr. F. W. Sargent told of his experience in examining the eyesight of employees on a Western road, several years ago; and among other things, said:

We found, in one case, an engineer and fireman, working together on the same engine, to be red and green color blind; that is, they were not positive of the red, which was a danger signal, and the green, which was a cautionary signal, and they confused them. We tried them at night by having several red lights of different intensities, and they confused them with greens; they judged by the intensity of the light rather than by the color. In one case there was a hostler who had been all right until he came to work where he had to take engines over a three-throw switch, where they had white, red and green lights. Where they had simply red and green lights, he could tell them one from the other, but after he got where the white light had to be regarded, he was confused with the third light. We found very few color-blinds who were not able to tell instantly the color of a single light, whether red or green, and if we put a red and green light together of a given intensity, they would separate them without any trouble; but put three or four lights together of the same color, but of different intensities, they would almost always confuse them.

We gave the engineers whom we found to be color-blind the privilege of taking the lamps and yarns home to study them, stating that if they could learn the colors so that they could not possibly be confused, we would rate them as of normal color sense; but we never found a case where a man could learn, no matter how long he had them. We had the grievance committee take the men in hand and they would pronounce them defective.

Mr. Sargent emphasized the need of always using a considerable variety of colors and intensities. A color-blind person can be readily tested simply by asking him the name of the colors around the room.

Mr. C. B. Ault criticised the rule of the New Haven road, requiring an examination, at the end of a year, of persons having hypermetropia. An examination should

be made much sooner than that, as a man with that defect is liable to failure of the eye—spasms of accommodation—when he is overworked. If a man of this kind is sick, he should be examined after recovery before going to work.

Mr. Delano, General Manager of the Chicago, Burlington & Quincy, said that he was always glad to get to a meeting of the Western Railway Club. "I do not know of any way in which a man can learn so much in a short space of time. We come here this afternoon and learn from a man who has been giving this subject special attention for many years, the gist of his conclusions from that study, and thus save an immense amount of laborious work on our part. I do not believe that there are any men in railroad operation who doubt that tests for eyesight, color-sense and hearing are an absolute necessity. . . . Some quite trying cases have come to my attention in the last fifteen years of men who were found to be defective, but who have simply said, 'But I have been running an engine fifteen or twenty years and have never had an accident, never went by a red light, never have cost the company a dollar, and here are men who you say have perfect vision, who have been in all kinds of trouble.' It is pretty hard in such cases to say, 'Well, we cannot retain you in this important service; we have to relegate you to something less important.' This misfortune to a man must be considered by the officers of the railroad the same way as any other misfortune that may befall them, and must be treated with the same consideration. A man loses a limb, or receives some injury which incapacitates him for the particular work he has in hand, and some other position is found for him, if he is a worthy man. The same must be done with misfortunes of the eye.

"The fact that one man with defective color sense or defective vision may run an engine with perfect safety, and another man who is not defective in these respects meets with disaster, indicates that there are other senses which we are not measuring as accurately, and the more we direct our examinations to determining with some degree of accuracy those other senses, the more nearly we will be doing good work in the employment of men. We ought to be able to measure in some way a man's presence of mind, his quickness of perception, and perhaps go even further and test his common sense. Those seem like rather difficult things to measure, but the study of psychology is moving on all the time, and there are men to-day who are trying to determine and devise methods of measuring some of the other senses besides those of simply the eyesight and hearing."

Mr. E. M. Herr answered questions of members who had expressed the view that glasses could be worn by enginemen on duty. Mr. Herr has ridden on engines a good deal and has worn glasses ever since he was a boy. Enginemen not only dislike, but would probably refuse, to use glasses on duty because in cold or rainy weather they cannot be kept clear. They would have to be wiped very frequently, and certainly every time the engineman should put his head out of the window.

Dr. Williams gave an interesting imitation of a color-blind examination, by putting some green glasses on the eyes of a man with normal vision. The subject, when tested with red lights, made the same mistakes that would be made by a color-blind. Dr. Williams stated that the acoumeter was invented by Mr. J. C. Bartlett, of the Burlington road. Discussing the use of colored worsted, Dr. Williams said that the skeins should be mixed up in a box; when fastened to a stick, the arrangement is too easily memorized by persons who are to be examined. Dr. Thomson has abandoned the use of the stick.

Dr. Williams said that where a person is ignorant of the names of colors the examiner himself can go through the motions of a test, with the yarns, and thus instruct the ignorant person. If he is not color-blind he can then take the test very quickly; while if he is color-blind the yarns can be mixed so that the exhibition cannot be taken advantage of.

Dr. Williams says that the Great Northern Railway has adopted scientific rules for the examination of its employees eyes.

Mr. Logan on the Interstate Commerce Law.*

Latterly, whatever may have been the fact as to previous periods, the act to regulate commerce has been fairly well observed by the larger railroad interests; and being well observed, the crudities of the law as existing have been discovered and the necessity of a more direct means of enforcement of the powers of the Government recognized. That an unjustly discriminative or unreasonable rate is wrong goes without saying. That when a given rate has been found to be unjust and unreasonable, after a full hearing of the parties by a disinterested administrative tribunal appointed by the Government, and another rate suggested as fair and just by the same tribunal, it must be manifest that the old rate ought to go out and the new rate come in; subject, of course, to review by the Courts.

The difficulty that first suggested itself was that a rate thus established by the Government would be in force until changed by the creating power. This was impracticable. Courts and commission could not sit for the purpose of readapting rates to shifting conditions. A rate which would be wise this year might be extremely unwise and unjust next year.

This wise solution of the difficulty was suggested, namely, that no rate thus governmentally established should continue in force longer than one year. If the rates which the Government establishes are found to be right in operation, they will meet the approval of both the shipper and the carrier, and, of course, remain in force. If wrong, or the conditions changed, they could be righted by the same power. That is to say, a new complaint to meet the new grievance may be made and the machinery proposed to be fixed by the new law would insure prompt redress.

The proposed amendments now before the United States Senate empower the Commission to put in force a rate found by them to be just, subject only to the supervision of the Courts. For my part, I have faith in the integrity of governmental agencies; especially those of the dignity of the Interstate Commerce Commission. I believe not only the shipper but the carrier needs governmental help. In short, it seems to me the time has come when the Government should reassume the right of a moderate control and supervision over the carriers occupying the Government's highways, and that this, in its operation, should reach forward as well as backward.

The amendments allow pooling and the formation of traffic associations, both the pool and the associations to be conducted subject to governmental supervision and control. This part of the act is favored by some, but by no means all, of the railroads. It is supported by a few shippers. Unfortunately, however, these provisions are opposed in principal part by that class known distinctively as large shippers. If, as Judge Knapp says, railroad charges, both passenger and freight, should be as fixed and stable as a postage stamp, he will, I hope, agree with me in saying that this result can be brought about successfully only through the allowance of pooling and the making of traffic associations.

Another marked feature of the proposed legislation is, that it makes the shipper who accepts rebates subject to the same penalties as are imposed upon the carrier. Moreover, it allows the power of the court to be invoked against both shipper and carrier, against the allowance or continuance of preferences, on the complaint of the commission; its decrees in this respect to be enforced by prompt injunction processes. If this act is passed, railroads can no longer be subject to the dictation of the great shippers as to rates and facilities.

A further feature of the proposed law is, that it authorizes the courts on the petition of the Interstate Commerce Commission, to enforce the observance of published rates. Everybody is agreed that it is wise to have a fixed charge and to have it published.

*From an interview in the *Philadelphia Press*, with James A. Logan, General Solicitor of the Pennsylvania Railroad.

The Metropolitan (London) Arbitration and Award.

The hearing in the matter of the system to be adopted for electrifying the London Underground (Metropolitan and District) was of extreme interest and of great importance. Our readers already know that the question was fundamentally between the continuous current and the alternating current and that the continuous current won in spite of the skill and ability of the Gans representatives. In the inquiry 4,593 questions were asked and the record fills 500 folio pages. Naturally it has been impossible for us to report the hearing, even by the briefest abstract, but in the latest issue of *Traction and Transmission* we find two papers from which a few paragraphs are reprinted below. What we reprint gives but a few of what seem to be the most interesting points brought out.

BY B. ALFRED RAWORTH.

In spite of the unpractical nature of the procedure there can be no doubt that the decision arrived at was a just one, Those who followed the case in court, or who carefully read the reports, foresaw what the end would be, although no one could fail to be impressed by the confidence of the Ganz witnesses, and their belief in their ability to attain their objects. One can hardly doubt that in the future they will make a success of the cascade system, although everyone who has yet tried it has failed and has dropped it in despair. Mr. Rice, the third vice-president of the General Electric Company of America, stated that his firm had made 200,000-h.p of induction motors, and that they had an experimental line two miles in length, on which they had tested cars propelled by such motors. As a result of these complete tests, they had come to the conclusion that to build motors of a substantially equal efficiency under running conditions, they would have to be very much larger and very much more expensive, and the cost of operation of the road would be greater. It was stated in court, although it was not formally proved, that Messrs. Brown, Boveri & Co., who have installed several three-phase railroads, had tried the cascade system, and had abandoned it, and it was generally admitted that other firms had had a like experience.

How is it, then, that Messrs. Ganz, who have as yet no railroad running on this principle, have sufficient confidence in it to propose it for the Inner Circle? Mr. O. T. Blathy, their representative, explained it as follows: The reason why experiments with motors in cascade have been unsuccessful, until Messrs. Ganz took up the question, is that the advantage of cascade coupling will only come out when the motors have a very high power factor.

Mr. K. de Kando, engineer and vice-manager of the electrical works of Messrs. Ganz, at Buda-Pesth, confirmed this view. He said that when he made the first trials he found that motors with a high power factor gave better results than those with a low one; but the highest power factor he tried was not high enough to make cascade coupling practicable. He then realized that by making the power factor higher he could get what he wanted.

It was proved in evidence in some cases, and not denied in other cases, that highly skilled electricians had worked on the problem of cascade working and had failed. These had not been unknown men crippled by poverty, and experimenting under adverse conditions, but had been the trusted servants of rich companies, who could command almost unlimited resources, and who had but to formulate their requirements to obtain plant and trained assistants to any extent. Yet it was suggested that these men had been unable to detect that, as the power factor of the machines was raised, the results came visibly nearer perfection, and that success could be reached by raising the efficiency from 90 to 94 per cent.

In such a case the onus of proof naturally lies with the new comer, and he must expose his case first. If he fails, the man in possession cannot be disturbed. Now, the continuous current is certainly in possession in the railroad world; at any rate, it holds more than 99 per cent. of it, and will continue to do so until the alternate current can show itself to have a better title. Nevertheless, in the case before us, the continuous current party opened the proceedings and produced one witness after another to testify to the fact that they held the ground. As to the claim of the other side, they could not say much beyond that they did not know the details.

The matter was also complicated by another mistake. The original inquiry, issued by the Joint Committee, asked for a tender for running the Inner Circle trains, the amount being specified at 220 train-miles per hour over a circuit of 13 miles. But in addition to the Circle trains there are many others running over parts of the Circle backwards and forwards between various suburbs and the City, the total amount of traffic being about 620 train-miles per hour. It seems to have been assumed that it was only necessary to multiply the original plant by three to make it fit the whole traffic. Tenders were sent in by several companies, of which two—those of the Ganz Company and of the Thomson-Houston Company—were selected as representative of the two systems. These, of course, gave a certain amount of detailed explanation; but in the interval between the delivery of the tenders and the sitting of the umpire, the Ganz Company introduced many changes in their plan. They abandoned the direct-driving, spring-supported motors for geared motors, and changed the periodicity from 15 to 25. They altered the acceleration so as to give 2.6 ft. per second per second during the period of cascade working, and 1.44 ft. per second during single working up to synchronism. They added circulating devices to the liquid rheostat to dissipate the heat, and they elaborated the control device. Further, they increased their sub-stations from five to 27, placing one at each passenger station, and thus defeated the contention that the rails would not serve for their return current. In the interval between the tender and the trial they got out a new design, unknown to the opposite side, and it was not until their case was actually opened that the full dimensions of the change were disclosed. Mr. Moulton tried hard to force Mr. Blathy back to his original position; but it was like hammering at a spring—his enthusiasm scorned all repression. He would make inventions while counsel was framing a question. Like the fiery old Roundhead who wrote:

> Between the stirrup and the ground,
> I mercy sought and mercy found,

he would compass in a flash of thought what other men hardly achieve by hours of agonizing struggle. He brought a blackboard with him to figure upon, and when objection was raised to it, replied that he could calculate equally well without it; as, indeed, he could. The purpose of the board was to aid his slower-witted auditors to follow him.

There are a few points in connection with the Ganz system about which our readers would probably like to be better informed, for it is full of promise, and it is likely that in the future it will find a wide field, although not in crowded urban lines. The very distinctive feature of the Metropolitan railroads is that the train is being accelerated during a considerable part of each run, the distance between the stations being on the average about half a mile. It was required that the entire circuit of 13 miles should be covered in 50 minutes, including 27 stops of 20 seconds each. In their original tender Messrs. Ganz foreshadowed an acceleration of 1.5 ft. per second per second during the cascade run, and half that amount during the succeeding run up to synchronous speed. The Thomson-Houston Company promised an acceleration of 1.5 ft. per second per second during the entire period of acceleration. Either plan demands a very large expenditure of power, far larger than can be obtained from a steam locomotive, and it is mainly in the ability to apply an enormous pull to a train that the advantage of electric traction lies in suburban lines. Before the hearing of the case, however, Messrs. Ganz reconsidered the question, and altered the acceleration to 2.6 ft. per second during cascade, and 1.44 ft. afterwards.

This was done with the view of decreasing the total amount of power required, although it necessitated more powerful motors, and a greater input of current at starting. It is well known that economy of power is obtained by rapid acceleration, because then the kinetic energy

stored in the train can be allowed to drive it during the latter part of the run, and can thus be rendered useful. The quicker the full speed is obtained the lower that speed may be, and hence the less energy stored in the train. In the cascade system it is claimed that a considerable amount of the energy stored in the train can be reconverted into electric energy and returned to the trolley wire.

The alteration in the design was probably to gain a better economy, and to put the alternate current motor on an equality with the direct-current motor. The work to be done was to move a train of six cars, the first and last being motor cars. The four intermediate cars were to weigh 15½ tons each, and the two motor cars 34 tons each. The weight of the unloaded train was to be 130 tons, and of the loaded train 150 tons. Of the 130 tons, 30 tons would represent electrical equipment. There were to be two primary and two secondary motors on each car, or eight motors on the train. During the first seven and a half seconds of a run the motors were to be in cascade, and gain in the time a speed of 12½ miles an hour, starting from rest. The secondary motors were then to be switched out, when the acceleration would become 1.44 ft. per second, and during the next 12½ seconds the speed would gradually rise to 25 miles an hour, which is the synchronous speed that could not be exceeded. Three of the four primary motors would then be switched off, and the train would run with one only. After a short time, depending on the length of the run, this last motor would be switched off, and the train would coast, decelerating at the rate of 2½ in. per second per second. When the speed had dropped to 17½ miles an hour, the cascade coupling was to be put on and kept on until half speed was reached, during which time about 9 per cent. of the energy stored in the train would be returned to the line, the deceleration being equal to about 3 ft. per second per second. At half speed the motors were to be disconnected, the air-brake put on, and the run concluded—the total time being 92 seconds. That was the proposition put forward by Mr. Blathy. To attain these results, 1,200 h.p. were to be provided. Two motors working in cascade would give 270 h.p., and the primary motor working by itself would give 300 h.p. The efficiency, excluding friction, was to be 94½ per cent. at full load, or, including bearing and gearing friction, 89½ per cent.; the power factor was to be 92½ per cent. With the motors in cascade the efficiency was estimated at 85 per cent., exclusive of gears and bearings, or 80 per cent. including friction, and the combined power factors 77½ per cent. The weight of a 300-h.p. motor was given at 2.7 tons without gear wheels, and the weight of a secondary motor at 1.7 tons.

The most objectionable feature in the Ganz system is the overhead trolley wires, and it is a wonder that they could be seriously proposed. It is a matter of common knowledge that trolley wires come down. The constant hammering of the trolley wheel produces crystallization at the insulator ears, and from time to time there are failures. Accidents have an awkward habit of occurring when conditions are favorable to the greatest damage being done. We have only to imagine a wire falling and curling along a platform filled with people driven into an Underground station by a sudden thunderstorm, to see what possibilities of disaster are attached to the system. True, there was a safety device guaranteed to put the wire to earth and blow the fuse, but unless that acted in a fraction of a second, death would result. One need not be a coward to object to trust one's life to the action of a spring 300 ft. or 400 ft. away. It is absolutely inexplicable that Messrs. Ganz should have seriously proposed such an arrangement, especially when they admitted that it was quite practicable to use, in place of the wires, angle or "I" bars, firmly fixed at short intervals to substantial brackets. The extra cost was estimated at less than £2,000 a mile.

Messrs. Ganz & Co. failed before the arbitrators, but their efforts have not been wasted. They have attracted the attention of the entire electrical world to their system, and if it has half the merits they claim for it, they should have no difficulty in getting it tried in many places. The time is most propitious.

Lecco and Sondrio bid fair to be the Mecca and Medina of electric engineers. All will turn their eyes that way next spring, and not a few will make the pilgrimage, for it must be remembered that in the arbitration all the witnesses—even those connected with large manufacturing interests—declared that they were not wedded to the existing system. Mr. Yerkes stated that he would put his money into that which was demonstrated to be the best, irrespective of its origin. It was shown that the direct current was the best for the Metropolitan Railways, but the broader question of what was best for an ordinary railroad was left unsettled.

BY PHILIP DAWSON.

The chief points on which the verdict of the umpire depended were those of safety, efficiency, and cost, and he gave his decision in favor of the system which, having regard to the actual conditions under which the traffic had to be carried out, would be the most certain in operation, the most efficient, and most economical in working. It has been thought by some that to decide a question as to what system should be adopted on its merits, would require a profound technical knowledge. That this, however, is not the case is shown by the fact that Mr. Yerkes, who is essentially a layman, had no hesitation in arriving at the right conclusion.

Acceleration.—This was a most important point of the problem, and one on which the decision chiefly hinged. The acceleration proposed by Mr. Blathy was 2.6 ft. per second per second during cascade connection, and 1.44 ft. per second per second when the secondary motors were cut out. No satisfactory evidence was brought forward to show that so high an acceleration as that suggested was compatible with the comfort and safety of the traveling public. Mr. Blathy, in the tender which Messrs. Ganz originally made to the Metropolitan and Metropolitan District Railway Companies, stated that an acceleration of 1.5 ft. to 1.8 ft. was the maximum value which could be adopted without shocks.

At Lecco-Sondrio the maximum acceleration obtained by Mr. Gisbert Kapp with one motor car was 1.5 ft. per second per second. It is an established fact in traction work that the maximum acceleration during the period of acceleration is likely to be more than double the average acceleration. Taking Mr. Kapp's evidence, and the results obtained by the writer, Mr. Parshall, and Mr. Chapman, at Sondrio, the maximum acceleration was three times the average. It would, therefore, seem that during the first period of acceleration practically the whole weight of the train would have to be upon the driving wheels to give the necessary adhesion, and it is more than probable that with the distribution suggested the wheels would skid. Tests, which have actually been carried out with approximately only 2 ft. acceleration per second per second, required that all the weight should be upon the driving wheels, and the shocks caused to the operators by this rapid acceleration were such that they could not be continued over any long period, as the men in charge were nauseated by the violent action of the train. Furthermore, with the automatic device suggested by Messrs. Ganz the acceleration would be above the proposed amount on down grades and below it on up grades.

Summary.—The evidence distinctly showed that the system recommended for adoption by Messrs. Ganz & Co. has not yet passed out of the experimental stage. Mr. Kando's testimony proved clearly that with the exception of some experiments made to test mechanical devices on the Budapest trial line, which is a mile long, there had been no practical experience on a large scale with the system advocated for adoption on the Inner Circle. Further confirmation was afforded by the fact that in the proposals submitted to the tribunal by Messrs. Ganz, that firm had abandoned many of the details which they had considered essential, and were embodied in their first plans—details which had met with much approval from the engineers who reported favorably on their plans. Among other matters may be mentioned the method of carrying the motor wholly on springs, and the low frequency of 15 cycles. It must also be remembered that none of the apparatus, either main or auxiliary, which Messrs. Ganz urged should be recommended by the arbitrator for adoption, had ever been constructed.

That the system is dangerous may be deduced from the evidence that trolley lines are liable to break, and that any contact with 3,000 volts is fatal. The safety devices that were suggested are untried, and, in accordance with general experience, untried devices are more than likely to be unreliable.

The claim of superior efficiency was not sustained by the evidence. In fact, it would appear that the reverse was the case, even giving the three-phase system the benefit as regards the power factor efficiency, etc., claimed by the makers. Neither was it proved that the system is cheaper to instal; the evidence indicated, on the other hand, that for the same class of machinery and same amount of power, there might be a difference in favor of the continuous current.

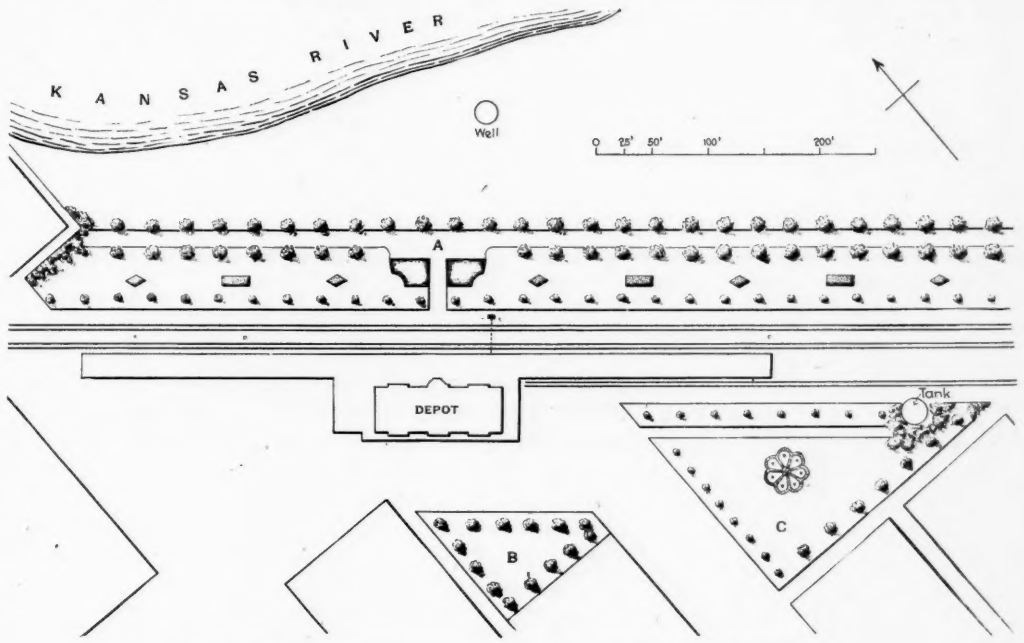
The decision of the umpire was a very fortunate and happy one; any other conclusion might have produced a deadlock, or caused the installation of a gigantic and possibly futile experiment which might have set back the electrification of the suburban lines of London for many years.

All those who listened to the evidence of Messrs. Blathy and Kando could not fail to be deeply impressed with their great ability. Mr. Blathy displayed a knowledge which clearly showed him to be a brilliant electrical engineer, and, notwithstanding the great difficulties under which he labored of having to give evidence and to bear the most searching cross-examination from such an able barrister and scientist as Mr. Fletcher Moulton, in a foreign language, he acquitted himself in a manner which won the admiration of everyone present. The reputation of Mr. Blathy in the other fields of electricity is well known. He may be called the typical polyphase engineer who, from enthusiastic conviction, wishes to solve every problem by its use alone.

Station Parks on the Santa Fe.

The Atchison, Topeka & Santa Fe contemplates the improvement of several of its stations during the coming season, by laying out parks around them. The accompanying plan shows the character and extent of the work to be done at Lawrence, Kan.

Across the tracks from the station lies a narrow strip of land marked A on the plan. Its nearest line is 15 ft. from the outer rail of the passing track. It extends 100 ft. wide to the brow of the river bank and stretches 900 ft. along the tracks. The features of embellishment here employed are two water lily basins, 25 x 35 ft. each, connected under the walk by a 10-in. tile for a fish way. Along the bank runs a walk with a row of tulip-trees, liriodendron tulipifera, on each side, forming a beautiful avenue. Along the front edge of the strip, about 10 ft. within, is a row of common cedars, juniperus communis, which are to be kept uniform. The rectangular and diamond-shaped figures, between the row of cedars and the avenue of tulip-trees, indicate where bedding plants may be used; shrubs will be planted at each end of the strip and on the slope of the bank. The low land



Station Grounds at Lawrence, Kan.—Atchison, Topeka & Santa Fe.

between this park and the river is dotted with some native trees, forming, together with the river and the opposite bank, a pleasing background.

A triangle back of the station (B) was improved some 10 years ago, the trees being elms. The main feature of the little park C is the design in the center, a bed, to contain 12 rosa rugosa in the center circle, 200 rosa hermosa in the ribbons and seven yucca gloriosa recurvifolia, one in each lobe. Facing the tracks, between the walk and edge a row of red cedars, juniperus Virginiana, will be planted; the south row, pin oaks, quercus palustris; and the west row, umbrella trees, catalpa bungei; shrubs to be planted around the water tank.

The shape of the land and its surroundings, especially in A, suggested a regular and straight line treatment, which has been adhered to throughout.

A. REINISCH,
Landscape Gardener, A., T. & S. F. Ry.

The Swiss State Railroad management begins, Jan. 1, 1902, with the one railroad which as yet has been acquired. During the negotiations and preliminaries prospects have changed for the worse. On the one hand the rate of interest has risen, so that the government will have greater fixed charges to pay than were at first estimated. On the other hand, there is depression in business, as elsewhere in Europe, and gross earnings have fallen off; furthermore, trains are to be run, more men employed and better wages paid than formerly, and so expenses have increased. Official estimates of gross and net earnings have been made for the year 1902 now for three successive years. The net was estimated at 9,279,430 francs two years ago, 8,500,000 last year; now at 7,974,000. This will be enough to pay the interest charges, but not the sinking fund for the retirement of the bonds within 60 years.

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CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

On another page appears a letter concerning the importance of a good organization for the work of the office of the superintendent of motive power. The writer suggests that when a superintendent of motive power has been away for a few days he will find on his return an immense amount of correspondence heaped up on his desk, the greater part of which should have been disposed of by his chief clerk. This seems a pretty obvious application of ordinary principles of office organization and yet so far as we can judge it is not common in railroad offices. On the contrary, it appears to be common for the higher officers to allow themselves to be overwhelmed with details which they might delegate. Not long ago a gentleman, who has made his reputation as an administrator, spoke of a number of somewhat unusual methods that he has introduced in his own offices. One of these is in the use of an Assistant General Manager. This officer is supposed to take charge of the General Manager's office in the absence of the latter, and to clean up each day's work. It is his business to despatch affairs and get them out of the way just the same as if the General Manager were in the office. The President of whom we are speaking made the sagacious observation that in practice it is better to decide a matter and get it started on its way than to hold it up, even if your decision is wrong. You get it out of the office and into the way of execution, and some one will correct your error. There is a good deal in this. Of course, no man of sense would think of carrying it to an extreme; but the principle is a good one to keep in mind. This same President said that it is physically impossible for the General Manager of a road of considerable size to do what he ought to do on the road and to keep up the office work at the same time. He simply cannot do both. Therefore, it is better to delegate part of his work, even if he must delegate it to a man inferior to himself in experience and judgment.

At last a railroad company has taken a definite stand in the matter of Federal regulation of rates; for such will be the interpretation which most people will put upon the expressions of Judge Logan, General Counsel of the Pennsylvania, printed in another column. In short, the Pennsylvania appears to be ready to let the Interstate Commerce Commission prescribe rates for the future, provided the "future" is limited to one year. Under the proposed law a railroad has the right to appeal against a reduction which it believes unjust, and this right reserves to the railroads about the same protection that they have now, except that, as Mr. Hines has pointed out, with the proposed law in force, the courts would probably accord to the findings of the Commission, as to facts, a stronger presumption of correctness than they now do. This, says Mr. Hines, will make the burden of proof, resting on the carrier, very severe. As Mr. Logan, however, is reputed to have had a hand in framing the bill which he is now discussing, we may conclude that he has pretty thoroughly studied the subject in every feature. If the Commission should set out to make any changes in rates on other than a bona fide and well founded complaint we may be sure that the Pennsylvania would be ready to enter a loud protest.

Next after Mr. Logan's utterance, the most interesting news in this field is an interview with Senator Elkins, Chairman of the Senate Committee on Commerce. He says: "There are two things which have combined to bring about the present condition of panic among railway men. One of them is the merger suit, the other is the series of disgraceful violations of the law. . . . There is no reason why the roads should not be readily prosecuted for their violations of the Sherman Act by any district attorney who chooses to undertake the work. The revival of interest in transportation matters and the apparent difficulties now opening upon the railway world have stimulated the members of the Commerce Committee to recognize the need of action." Mr. Elkins said that his proposals were listened to in such a way as to make him feel that the prospects for doing something are much brighter than they have been. Even those who are opposed to pooling were disposed to admit that some concession of the kind might be worth while if by that means railway confusion could be avoided and some more advantageous arrangement obtained for making the orders of the Interstate Commerce Commission effective. The Senator predicted that the necessary outcome would be the establishment of a railroad court which should have supreme power in railroad matters and should be invested with power to fix rates upon complaints, the members being appointed for life like those of the Supreme Court. Whatever degree of credence may be accorded to Mr. Elkins as a prophet, it is gratifying to see such a definite recognition of the anomalous condition of our present regulating body—a court and a prosecutor combined.

At Chicago the reporters continue to be unable to describe the situation at all clearly. The applications for injunctions against the principal roads between that city and Kansas City were to be presented to the United States Court at Kansas City on Wednesday. The press despatches say that the district attorney will make application under the anti-trust law as well as under the Interstate Commerce Act, though the complaint sent to him by the Commission dealt only with the last named. It is also said that grain rates as well as live stock rates will be included in the injunction. At Louisville the grand jury found that the Louisville & Nashville had made illegal rates on grain to the southeast and found indictments against officers of the road; but the press despatches do not give the names or the titles of the officers. The principal meat of the gossips during the past week has been a report that the Trunk Line Association would be dissolved, but no evidence is adduced to show that any action has really been taken. One railroad officer stated that the dissolution of the Association had been considered, in the past; not because of any supposed illegality, but because some roads deemed it too expensive. One New York paper prints a circumstantial account of how roads in the Association have for five years maintained a very strong and successful agreement on westbound freight, enforcing divisions of tonnage by imposing a penalty on roads taking more than the agreed percentages; and that it is this agreement that is now dissolved. This report is denied by every officer whom the reporters have seen about it. The traffic manager of one large Western road has issued to his subordinates a letter from which the following extract is published:

> "You are no doubt advised through the press and other sources that the Federal authorities are about to take steps not only to secure the immediate enforcement of the provisions of the act to regulate commerce, but to punish those guilty of violations.
>
> "You are also fully aware of the earnest efforts that this company has made to conduct its business in conformity with the law. . . .
>
> "We are satisfied that the time has come when it is no longer safe for the officers, agents or patrons of the railroads to be parties to arrangements that can in any sense be considered as in violation of the law.
>
> "You will therefore be careful to see that nothing is done by yourself or your subordinates that is in any way at variance with the policy outlined herein. . . ."

But what the "policy outlined herein" actually is, does not seem to be very clearly defined; and the reporter adds, perhaps unavoidably, by reason of a mental infirmity which has become a fixed habit, that the result of this good resolution depends on how well the other roads behave.

Block Signals in Tunnels.

On the first page of this issue is a diagram sent in by a correspondent of a proposed scheme for using incandescent electric lights as auxiliaries to ordinary block signals in tunnels. Our correspondent's main idea is good, but he has not worked it out as well as was done by his predecessors of 1891 and 1893. Moreover, his mistake appears in the scheme of another correspondent (which we do not print), and we give this sketch for the purpose of asking both correspondents to again read our article of Feb. 14 on this subject.

As 150 ft. is not a sufficient distance between a home and a distant signal, we suppose "Herkos" means to have each home signal post carry a distant signal, corresponding with the home signal next in advance (indeed, he says as much, though the drawing does not show any distant). But to put the home and the distant together is probably undesirable in the Fourth avenue tunnel, for trains are there so frequent that the distant should not be any farther back from its corresponding home signal than is necessary to give room for stopping. At present the distant signals are about 1,200 ft. back, while the next home signal is 3,000 ft. to 3,800 ft. back. It would be possible, of course, to put the home signals only 1,200 ft. apart, cutting up the whole tunnel into 1,200 ft. blocks, but with manual signals that, considering the present limited terminal facilities, would be an unnecessary expense.

The incandescent-lamp signals, which were temporarily used in the Weehawken tunnel in 1893, were of only one color. A clear light indicated all-right and the absence of a light meant the contrary. We cannot see why that is not just as safe and convenient as the plan employing two colors. It is simpler to construct and work, and we think it is at least as simple from the engineman's standpoint.

It is probable that lights much farther than 20 ft. apart would answer all practical purposes in the darkest tunnel. At 30 miles an hour lights 200 ft. apart come into view every five seconds. If one were to spend a given amount of money for lights the best use of it would be to put the lights as far apart as could be done while still keeping them easy to locate, and thus provide landmarks for as long a distance as possible.

The first of the earlier schemes to which we allude was described in the *Railroad Gazette*, March 13, 1891. This was designed for use in connection with the fixed signals in the Fourth Avenue tunnel, just as they now are. Lights, 200 ft. apart, are shown in the diagram, forming a line from each distant signal back to the next distant signal. When a signalman clears his distant signal, he closes the circuit to all of the lights from that signal forward to the distant signal at the next station. After the passage of a train, he cuts off the current from the lights behind the train; thus a row of burning lights indicates to an engineman that the track is clear for one block section. In the *Railroad Gazette* of 1893, page 391, a description was given of an arrangement similar to this, designed to work automatically, by track circuits, which was tried that year in the tunnel of the West Shore road at Weehawken, N. J. From the Weehawken terminal, westward, the line was divided into sections of 800 ft., 900 ft., 1,100 ft. and 1,900 ft. Lights were fixed at the side of the tunnel on a level with the engineman's eye, at points 100 ft. apart. The passage of a train through a block section actuated a relay, in the usual manner, and by this means cut off the current from the lights, conveying the indication for that section. The lights for a given section were far enough back to give the engineman time to stop, after passing a light which was not burning, and before reaching the danger point.

Both of these schemes, as well as that of Herkos are costly; and all of them involve a multiplication of signals which is not called for by any sound principle of signaling. We must note a distinction between multiplication of signals and multiplication of lights. In block-signaling a block-section is of a certain prescribed length, beginning and ending at known points. A distant signal (the electric lights in all these schemes are essentially distant signals) is fixed at a point some distance back of the beginning of the block-section. It is to guide the engineman with reference to that one point, the beginning, and no other. It is put at the point where the engineman must shut off steam and apply brakes in order to stop at the beginning of the block section. A distant signal set farther back causes unnecessary delays, because in case train A is delayed, train B is compelled to slacken speed earlier than is necessary. A distant signal not far enough back is also a cause of delay, because it compels fast trains to slacken speed for the purpose of making sure that

the brakes can be made to stop the train within the reduced distance. The distant signal, therefore, must be fixed at one point as related to the beginning of the block section; and any additional signal or signals, whether one or a dozen, or whether in the rear of, or in advance of, the main distant signal, are superfluous.

If a railroad line, in a tunnel or elsewhere, be divided into block-sections of a uniform length of 3,000 ft., the beginning points would be 3,000 ft. apart; and if 1,500 ft. be the distance required for stopping trains, the distant signals would also be 3,000 ft. apart, each one 1,500 ft. in the rear of its corresponding beginning-point or home-signal. If the block sections were made 300 ft. long there would be ten times as many blocks and ten times as many distant signals, but still each distant signal would be 1,500 ft. in the rear of its corresponding home-signal or beginning-point. This distance, 1,500 ft., would be the one constant factor.

This being so, the only use of additional lights is to aid the engineman in finding this one distant signal for each block-section; and for this purpose the expense and complication of making these lights into signals, to be turned on or off, or to be changed in color, can just as well be avoided. A simple constantly burning light answers all purposes.

A landmark is all that is needed. In a tunnel like that at Fourth Avenue, with frequent openings admitting light from the outside, no artificial landmarks are needed, provided the successive openings are not too much alike. With 10 or 50 openings, all alike, the engineman would have to count from signal to signal, which in some circumstances is an unreasonable burden. If distant signals were only 300 ft. apart they would come into the engineman's view every 3 to 6 or 8 seconds, according to the speed, and no landmark lamps would be needed. With the distant signals 3,000 ft. apart, a row of 10 or 15 lights 200 ft. to 300 ft. apart, could be so fixed as to enable him to get his bearings as to signal B as soon as he had left signal A. This can be done by fixing each light a few inches higher or lower than the preceding one. We mentioned this plan in our article of Feb. 14, page 112.

It must be borne in mind that in providing one distant signal, and no more, for each block section, and in locating such signals at uniform or nearly uniform distances from their respective home signals, we are not acting on a scientifically complete theory, but on a compromise made necessary by the lack of uniformity in speed of trains, and in grades. A train running 20 miles an hour may want a distant signal only 300 ft. in the rear of the stopping point, or, on a steep ascending grade, even less than that. One running 90 miles an hour wants a mile (we do not mean that with the best brake power the whole of this distance would be used, on a level, in stopping; but with high speeds a larger percentage must be allowed for errors of judgment). But as it is impracticable to have different sets of signals for different speeds, the one set must be adjusted to the needs of the trains which make the most use of the distant signals, and faster trains must adjust their speed to the signal.

Annual Reports.

Missouri Pacific.—After being operated for nine years without making any disbursements of profits to shareholders, the directors last June again placed the shares on a dividend basis of five per cent. a year, and the record of the operations for the fiscal year ending Dec. 31 last, now at hand, shows that the dividend balance for the year was virtually double the amount paid. Surplus income over all charges was $7,478,500 on $76,402,875. (By the Denver & Rio Grande purchase and by conversion of debentures this total of stock is $25,971,000 more than the stock outstanding on Dec. 31, 1900.) This surplus compares with $3,818,600, or 7⅔ per cent. on the outstanding stock a year ago. Increase in surplus in 1901 was $3,659,000 more than the actual dividend disbursement, $3,563,800. The two factors chiefly contributing to this showing were the heavy increase in receipts (gross earnings gaining $4,368,800, or 13½ per cent.) and the new economies brought about by the introduction of heavier engines and cars, by grade reductions and other improvements and new methods in handling the trains.

Increase in gross earnings is accounted for by increase of 516,178,000, or 19 per cent., in number of tons moved one mile, and increase of 20,437,000, or 8⅕ per cent., in number of passengers carried one mile. The increase in freight train miles was only 688,800. In each case there was a decrease. The average receipt per ton mile fell from 8.54 mills in 1900 to 8.25 mills in 1901, and the average passenger fare per mile from 2.22 cents to 2.21 cents. Earnings per freight car mile increased over 6 per cent., and freight train mile earnings by over 9 per cent. to $2.30. Freight traffic accounts for $3,451,500 of the total increase of $4,368,800 in gross earnings, as will be seen by the following summary of the income account for the last three years:

	1901	1900	1899
Miles operated	5,455	5,352	4,938
Freight earnings	$26,676,118	$23,224,617	$20,008,189
Passenger earnings	5,975,544	5,546,092	4,978,013
Gross earnings	36,661,094	32,292,287	28,079,820
Maint. way expenses	5,013,920	4,306,996	3,779,712
Cond. transportation	8,789,816	8,123,336	7,916,874
Motive power	7,088,137	5,958,111	5,205,892
Maint. cars	1,905,763	2,106,640	1,950,080
General expenses	817,878	708,311	779,554
Taxes	1,082,916	1,065,094	915,164
Total expenses	24,698,430	22,268,488	20,547,277
Per cent. expenses	67⅜	69	.....
Net earnings	11,962,663	10,053,799	7,532,543
Sundry charges	341,683	785,340	2,096,260
Balance	11,620,980	9,238,459	5,436,283
Investments, etc.	2,473,431	1,371,889	1,914,328
Net income	14,094,411	10,610,348	7,350,611
Fixed charges	6,615,889	6,791,798	6,194,027
Dividends	3,563,802	.....	.....
Surplus	3,914,720	3,818,550	1,156,584
Special approp. for improvements, etc.	2,846,609	.....	.....

In 1901 the increase in expenses was 11.4 per cent. and in net earnings 17.6 per cent. The increase in income on investments in 1901 is accounted for by a gain of $557,515, in interest on holdings of Texas & Pacific bonds, 4 per cent. being paid, against 1½ per cent. for 1899, while the 1902 income will be credited with an interest payment of five per cent. In addition, $365,000 was received as dividends on Denver & Rio Grande stock.

It will be seen that expenses of conducting transportation increased $666,500 in 1901, and even making allowance for the fact that considerable proportion of the increase shown in motive power expenses represents wages, etc., which would be included in this account under the form for allocating expenses adopted by the Interstate Commission and in general use by the railroads, the very material reduction accomplished in handling the increase of nearly 19 per cent. in tonnage movement is apparent. The changes in maintenance account represent in part the further extension of the improvement work. The increase of $706,924 represented in the increase in charges per mile from $777 to $905 in 1901. In addition to direct charges against expenses, considerable funds were otherwise provided for improvement and new equipment.

Against the surplus income $2,608,600 was charged for improvements, of which $1,000,000 is for work to be carried out in the current fiscal year. For new equipment $6,267,400 was charged to capital account. Improvements to property carried out last year are reported as $2,645,000, of which $1,608,600 was provided by the charge against income referred to above, and $398,300 was included in maintenance expenses. Of this expenditure, the largest item was $1,020,300 for reduction of grades, and $369,000 was excess cost of new bridges over structures replaced, these two items of improvement work having also been large in previous years.

Capital changes in the past year were extensive and represented important matters. The first of these is the purchase of the controlling interest in the stock of the Denver & Rio Grande railroad, which protects the Missouri Pacific connections through to the Southern Pacific and gives it a strong position in the traffic of Colorado and Utah. The company now holds $7,300,000 of Denver & Rio Grande preferred stock and $14,800,000 of common stock, purchased at a cost of $13,866,400. These holdings are much less than a majority of the $82,146,000 outstanding capital of the Denver & Rio Grande, but other stock is held by Missouri Pacific interests. In addition, $11,628,000 debenture bonds issued last year were converted into stock, so that the total issue of new Missouri Pacific stock last year was $25,971,000. In addition, $2,636,000 bonds were sold from the treasury, as were $2,463,000 Iron Mountain bonds, and $1,392,000 Iron Mountain car trusts were issued. Besides the Denver & Rio Grande acquisition, separately operated, the New Orleans & Northwestern was bought to give a line to New Orleans shorter by 30 miles than the route by way of Alexandria. The line along the Missouri River from Jefferson City to Boonville and from Lake City to Kansas City, was finished, completing a low grade road for 248 miles into the latter city. By avoiding the heavy grades of the old line this will materially reduce transportation expenses. Other new mileage was added by purchase or construction, the total cost carried into capital being $2,769,300, with $1,921,400 advanced, temporarily, from current funds and $1,321,000 was expended on new lines not completed.

The last of 80 locomotives bought in 1900 were put in service and contracts let for 14 passenger engines and 74 freight, besides 7,000 freight cars and 36 passenger-train cars, at a total cost of $6,118,072. In addition, 68 freight and 15 passenger cars have been contracted for, to be delivered in 1902, together with 880 freight cars and other equipment. These heavy purchases of equipment, with the record of growth in traffic, which promises to be continued in 1902, are particularly interesting, because of the shortage of the corn crop last summer, which affected the States in which the largest share of Missouri Pacific's mileage is situated. Despite that loss, the tons moved increased 1,578,300, or 13.8 per cent., and larger tonnage is shown in all commodities, except animal products. But even live stock traffic was larger by 5.8 per cent., though the gain was entirely on the Missouri Pacific proper, the Central Branch and the Iron Mountain losing. The effect of the drought was shown in this falling off in live stock and other animal traffic, in heavy decreases in corn and flax, in decreased attendance at summer meetings, and in other ways. But there were many offsets, besides the general increase in business. There was larger movement of cotton seed products into the cotton producing sections of Kansas and Nebraska, for instance, and larger movement of wheat. The number of cars of corn loaded locally shows a decrease of 11,714, or a third, compared with 1900.

Changes in traffic movement and tonnage are shown below:

	1901	1900	1899
Rev., tons moved	13,059,030	11,480,730	10,993,900
Passengers carried	5,074,890	5,308,520	4,250,050
Tons 1 mile†	3,234,222	2,718,044	2,419,582
Passengers 1 mile	270,395,220	249,958,890	229,160,690
Freight train-miles	12,465,980	11,777,164	11,469,649
Passenger train-miles	8,033,680	7,396,700	6,596,850
Loaded freight car-miles	215,436,920	194,563,500	184,757,670
Per cent. loaded car-mile	77.4	75.9	76.8
Tons per mile	2,787	2,422	2,067
Rev., freight train load	259	231	211
Total freight train load	284	252	.....
Average freight haul	229	221	237
Freight train-mile rev.	$2.305	$2.114	$1.87
Ton-mile rev., mills	8.25	8.54	8.27

† 000 omitted.

State Railroads in France.

In the French substitute for our *Congressional Record* is published a report, dated July 6, 1901, of a committee appointed to examine a bill fixing the appropriations for the State Railroad system for the next year. The committee's report, however, gives but a few pages to this subject, while enough to make quite a volume are devoted to an elaborate defense of the State Railroad system, and to setting forth the success of its administration during the 21 years of its existence. This is understood to be the work of M. Bourrat, who, in season and out of season, has advocated bringing the systems of the great companies into the State system.

The present French administration has strong socialistic tendencies, but it is said to be unwilling to consider the extension of the State system at this time. There have been periods when, with more conservative cabinets, there was a stronger disposition to convert the private into State railroads. M. Bourrat's report is fortified by abundant statistics and gives with much detail the history of the formation of the present State system, which needs to be considered in passing judgment on the results attained.

The Government took over a number of bankrupt lines, some of them partly finished, exchanged part of them for others of the Orleans company, and tied the lot together to make a new system in the midst of three of the old ones. Financially, the results have not been brilliant, but they have improved. The net earnings, which were but 1.04 per cent. on the capital expended in 1885, and averaged 1.33 per cent. for the five years ending with 1889, were 2.25 per cent. in 1900 and 2.20 per cent. in the last five years. The gross earnings per mile have increased 45 per cent., the net 141 per cent. The freight traffic has increased 90 per cent. since 1879, and the average rate per ton per mile has decreased 32 per cent.

The report claims that the State Railroads have taken the initiative in improving the condition of railroad employees by increasing wages and reducing hours of work and granting other privileges, which is probably true; it is very hard for the government to resist any movement in that direction; but as notable progress has been made meanwhile, not only on the systems of the six great companies, but in most other European countries, it is hardly safe to give the whole credit for it to the little French State Railroad system (1,750 miles).

It is also claimed that the State system has been more ready to adopt improvements of various kinds than the great companies, concerning which there are probably two opinions. The French railroads have made great progress in some directions since 1879; and so have the German railroads, with many more State roads; but we think we have not quite stood still in America, with no sign of a State railroad to show us the way.

The New York *Tribune* reports, with considerable flourish, that the New York, New Haven & Hartford has agreed with the Pennsylvania on the main features of a plan by which the trains of the New Haven will use the new station of the Pennsylvania in New York City when it is completed two years hence. As the reader will recall, this new station is to be at 33d street and Seventh avenue, on the line of an underground railroad to extend from New Jersey eastward across the Hudson River, Manhattan Island, and the East River, to Long Island City. The President of the New Haven road says the story is unfounded. This statement is made, no doubt, without reservation; but the scheme has elements of future probability because the New Haven, by means of boats, now runs two passenger trains daily to and from the Pennsylvania. A rail connection would be very desirable for this service, to say nothing of the New York City terminal traffic. Trains of the New Haven could reach the tunnel to the new 33d street station by the construction of a line of about three miles from the terminus of its Harlem River branch southward to the tracks of the Long Island Road in Long Island City, which line would involve a costly bridge across Hell Gate, Ward's Island and Randall's Island. The portion on Long Island would also be very costly. The report says that a portion of the New Haven traffic would continue to use the Grand Central Station at 42d street. This goes without saying, as, with the normal growth of the traffic of the New Haven road, it will need all the facilities that it can get, either in the 42d street station or at the new location. The Harlem River Branch, over which the new route would lie from New Rochelle to the terminus, is a busy freight line of 12 miles which now has, for most of its

length, only two tracks. The connection of this branch to the Long Island road, for freight traffic, by a line across Hell Gate on a high bridge, which was proposed a year or two since, would be rather roundabout for passenger traffic, as the line joins the Long Island road some miles east of the Long Island City terminus. But even with this disadvantage it might be better than a boat transfer.

The Railway Signaling Club.

The regular meeting of this club was held at Chicago, March 11. Vice-President Charles Dunham called the meeting to order, and as the principal topic for discussion was a paper on the Time Lock, prepared by himself (published in the *Railroad Gazette*, March 7, page 168), he called to the chair Mr. Denny. About 35 members were present.

Mr. Dunham said that he had found the time lock comparatively satisfactory. This lock, made by the Union Switch & Signal Company, consists of a rack and pinion, the movement of which is regulated by a pendulum. When a lever is reversed, the vertical bar carrying the rack is moved upward; when the lever is put home, the bar drops by gravity, but its motion is retarded and regulated by an escapement wheel which is controlled by a pendulum. By suitable adjustment the length of time occupied in the downward movement can be fixed at any point between 15 seconds and 3 minutes. Except where traffic is heavy the time limit can be made 2 minutes. The lock is applicable to distant signals at any distance, within, say 2,000 ft.

Mr. Elliot (C. M. & St. P.) spoke of the objection to a time lock in cases where a train is unexpectedly delayed and the time interval expires. The lever being released, a superintendent could not get evidence as to the blame for derailments. In three-quarters of the derailments of this kind, the engineman (and his friends on the train) will testify that the signal was unfairly taken away from the train. At busy crossings a time interval, even as long as one minute, would be objectionable. . . . In the latest electric locking that we have put in, the current travels through only 100 ft. of track. In the maintenance of track circuits at interlocking, it is very necessary that the installation be well maintained. We have found it useful to oil the insulating joints about once a week. Dust and dirt on the fiber easily make a short circuit during wet weather, and black oil does away with leakage when the fiber is wet. It will raise the resistance from a half ohm up to fifteen.

Mr. Dunham, answering questions, said that the time lock should be put on each home signal lever governing a high speed route. The time lock is connected in such a manner with the cross locking in the machine that the signal can be thrown to danger at any time after it has been given, but the derail, which is locked up, cannot be opened until the time limit has expired. The cost named ($55) applies to signals in one direction.

Mr. Elliott: The ordinary electric locking circuits are designed to drop the locks on the derail levers whenever a home signal is clear, no matter where the train is, or how far the signal is away; and leaves them locked until the train goes on and off the track circuit.

Answering a question Mr. Elliott said: It is very hard to separate the cost for maintenance of electric locking from that of interlocking, as signal repair men look after the electric locking parts as well as interlocking. The repair men all know how to clean batteries, maintain track wiring and track insulation, and if necessary trace out any broken wires; they cannot locate the grounds and are not allowed to change the adjustment of the relays; but they all have keys of the relay boxes and in case of failure can make an examination. In the majority of places where we have electric locking, particularly those that are far away from where a repair man is stationed, we have no difficulty in having the man in the tower practically do all the maintenance of the circuit. If properly put in, with large-sized wire and good insulation, the track circuit may take care of itself, except for a broken wire and the cleaning of the batteries, and signal men can easily be taught to look after this part of it. We have cases where a signal man has maintained locks for a year and a half, during which time an inspection of the plant was made twice by the regular repairmen and not once in all this time was anything done to the relays or any part of the circuit except to mend broken wires, which was done by the signal men. Where men are operators and have not time to go out to look for a break, we do not expect them to clean batteries or do any part of the maintenance. The only additional expense that we find that it causes us is in case where the man breaks the glass when it should not be, and we have to send men out to put in another one.

Mr. Rhea: Why use the lock on the home signal only? The distant signal should do the locking.

Mr. Elliott: The home signal is the one that gives the engineer the right to go over the crossing, and there is nothing to compel the signal man to clear the distant signal. If the signal man should neglect to clear his distant signal, and the engine man went off the derail from his own fault, he could swear, and so would the whole train crew with him, that the derails had been taken away from him and there would be nothing to show whether they had or had not been. We had a case recently where, owing to a confusion of lights the engineer mistook the signal that should govern him and went off the derail at high speed. It was only by his testifying as to the point where he was at the time the signal was taken away from him that we were able to show that it was an impossibility to have taken the levers away from him at the time he said it occurred.

Mr. Dunham: I would like to ask Mr. Elliott if it is his practice to apply electric locking to signal levers and not to derail levers?

Mr. Elliott: Only on the derail levers.

Mr. Rhea: Do you use the distant signals on your road?

Mr. Elliott: We occasionally do; I think all the plants have them.

Mr. Rhea: What excuse does a man have for running at high speed after he gets the distant signal at caution, and comes to the home signal not under control?

Mr. Elliott: The gentleman is asking a question which I am unable to answer. The fact of the matter is, "control" means any speed at which the engineer cares to run. What we are after is to prevent the signal man from taking the derail after having once cleared the signal. The important point is, when the engineer has once seen the home signal, he has the right to go ahead at any speed that he believes is right, and if the derail is taken away from him he is thrown on the ground. If the clearing of the home signal locks the derail levers up, there is very little hardship, because at the worst the signal man can easily release himself; it takes not more than two minutes to do this, and it makes him more careful.

Mr. Rhea: I believe the American Railway Association train rules say that an engineer finding a distant signal at caution will approach the home signal prepared to stop.

Mr. Elliott: Not if he can see the home signal standing clear.

Mr. Elliott: Answering question. The release box is put in the lower room. I have in several places a screw release which takes one minute to effect a release. The signal man puts his home signal to normal, leaves it there and spends one minute on the screw release, and releases the derail levers, after which he goes upstairs and can open the derails. This takes rather more time than I thought necessary, and in several cases I have had push buttons put in downstairs, so that the man walks into the lower room and to the relay box and presses on the button. It takes him an average of a minute or a minute and a half to do this, and during that time the home signal must be in the stop position. While the time taken is no more than with the time lock, the fact is that the man must definitely determine to go down and effect the release; and in doing that he is taking all the responsibility on himself. With the time lock, the thing releases itself and if there should be any delay to the train, or any other stop, making it desirable that the signals should be taken away, the levers are released and the man may throw the lever through forgetfulness.

Mr. Rhea: I think Mr. Elliott ought to have a rest for a few minutes. I would like to ask Mr. Dunham what method of locking he used?

Mr. Dunham: Our method has been to apply the locks to the derail levers, using the track circuit. In a general way the applications are very similar to those in use on the Milwaukee road. We have a hand switch in the lower story of the building, and in addition to that in most cases a hand release on the interlocking machine, that is, a mechanical hand release. Some of the members appear to think that I question the advisability of electric locking. I do not. But as I understand it, the main object of putting in electric locking is to prevent the possibility of the tower man changing the combination immediately in front of an approaching train. Now, the time-locking device, in my judgment, covers this point very well. The tower man, we will say, sets up the combination for an approaching train; the home signal is clear, and the train within a reasonable distance, and it will cover that distance and be at least on the crossing before, we will say, a minute's time. But if it consumed a considerably longer period the chances of anything like a serious derailment on account of the tower man changing the combination is rather remote. The time lock covers the main point which is covered by the use of electric locking.

Mr. Rhea: The primary object is, to prevent cases of wrong movements on the part of a sleepy tower man. He goes to sleep having set up his route in one direction; is suddenly waked up, and, thinking the train is on the road, proceeds to do something before he can rationally do anything. The time lock will check him in his movements and in all probability will give him time to come to his senses. Mr. Elliott's objections are pertinent, that in putting on a lock we want something positive to show in regard to a derailment at an interlocking point. If you have all the money you want, I do not believe the time lock a good scheme; if you have a certain amount and can only go so far, it probably is a good scheme.

Mr. Elliott: The cost of putting one engine and a few cars on the track even if not running at full speed will amount to more than the maintenance of the electric locking for five years. The damage done by derailment is not governed so much by the speed as by the length of train. In one instance at the junction of a single and double track, a freight train was derailed and about twenty empty cars in the middle of the train were spread over both tracks. Two passenger trains were barely stopped before getting into the wreck.

The Chairman: As to the origin of this time lock, it is not an antagonist of electric locking, but is made for use on those roads that cannot afford to maintain so expensive a luxury as electric locking.

Mr. Elliott: We do not call it a luxury.

Mr. Dunham: I think the word "luxury" is applicable in a good many cases.

Mr. Elliott: I do not like to let that word "luxury" stand; I cannot say that we are luxurious with any of our appliances we put on in signaling on our road, and I find that the difference in expense of the original installation and difference in maintenance are nothing like what Mr. Dunham tries to make out.

Mr. Wileman (L. S. & M. S.), in answer to a question, said: We have one electric locking at Millers, where it has the straight track circuit of 1,500 ft. from the distant signal, each distant signal independent of the other. We have no trouble with it. We have a handle on the end of the machine, a screw handle, and it has proved very satisfactory, so far, and we have one plant with a time lock on it, and that has proven satisfactory in a general way; we have heard no particular complaint from it.

Mr. Elliott: The Union Pacific is putting in electric locking on four ordinary switch stands at the end of a double track. Recently a freight train going into a double track from a single track was thrown into train standing on the double track; the switchman lost his head and threw the switch right ahead of the incoming train, so they are going to put in distant signals.

The Chairman: I have here two letters.

(Letter from J. I. Vernon, N. Y., N. H. & H.)

I believe that there should be double home signals at all principal interlocking points; that is to say, have another stop signal 1,000 ft. from the regular home signal and the distant signal 1,200 ft. back of that, so that when an engineer has run one signal at danger he has yet another show before he runs on to the crossing or to the danger point where he is liable to strike another train. I do not believe that engineers run signals recklessly, but there is such a thing as an engineer making a miscalculation. . . .

(Letter from H. F. Baldwin, Chief Engineer Chicago & Alton.)

With a limited and a relatively light traffic, the danger of main track derails does not emphasize itself; but as trains multiply and the speed increases, there is a danger from derails. We have in recent years had a great deal of experience in interlocking, and can now appreciate the folly of the promiscuous introduction of main track derails. The elimination of derails in main tracks would do more toward decreasing derailments at interlocking plants than all other things combined could possibly do. . . . Have we not learned, and at great cost to our companies, the same lesson that was learned on the busy lines abroad, and is it not time for us to profit by experience? Has not the practice under heavy traffic conditions tended to the abolition of main track derails?

In all plants that I have had charge of installing (within recent years) this feature was eliminated, where statutory requirements did not demand it; not on the ground of economical installation, but from experience as to the danger of main track derails, without a compensating advantage in safety. At most places there is certainly no possible excuse for derails except in sidings.

I appreciate the fact that the rules of the Illinois Railroad and Warehouse Commission were approved by the engineers of the Illinois railroads. Since those rules were made we have learned something about signalling and interlocking, and, in my opinion, we could not do a better service to the railroads in Illinois than to strongly recommend the modification of the rules of the Commission so that these derails may be omitted.

Mr. Cade: The question of the desirability of having any derails at all in main tracks is one of the burning questions to-day. When Mr. Vernon's letter was read I noticed there was considerable amusement. Let me tell you that Mr. Vernon is the advance guard; he is just a little bit ahead of the times, that is the only trouble with Vernon. What Mr. Vernon proposes is that if an engineer does go by his first signal in the danger position he will not instantly pay the penalty of his negligence. All operating officers on railroads that I have spoken to want to do something to prevent damage being done by an engineer disobeying his signals. . . . I take issue with Mr. Baldwin when he says that the agents of the signal companies have foisted the derails on the railroad companies. If the agents of the signal companies had not held back they would have had two derails, or possibly three. The real reason was that the enginemen, at the time that the derails were introduced, had not been so disciplined that the superintendent could rely upon their stopping before they had passed the signal. What the agents of the signal companies have done all through is to try to impress upon the railroad companies the necessity of making the enginemen obey the signals.

Mr. Elliott: The subject of derails was discussed in the club a year ago. At that time I showed that the derail had prevented a great many more accidents at crossings than had happened from the wrong use of the derail. The evidence was very much in favor of the use of the derail.

Mr. Cade: The conditions are changing. Discipline in regard to signals generally is very much more strict; they are getting very much better results, and as those results accumulate the necessity of the derails will cease, I believe.

Mr. Rhea: Mr. Cade is not entirely consistent. He

says that discipline is very much better and we are making great progress and in the next breath he agrees with Mr. Vernon.

Mr. Cade: My friend on the other side is all right in regard to my inconsistencies; I have a bunch of them. There is some little distinction in the use of the overlap and the derail. Where you can use an overlap without interference with the operation of the train and you can prevent the result of an engineer disobeying his signals from becoming disastrous, I think that it might be wise to use it; if, however, you put in a derail that will possibly cause nearly as bad an accident, then there is a serious question.

The Year's Traffic at the Sault Ste. Marie.

On Jan. 27, Mr. Joseph Ripley, General Superintendent of the St. Marys Falls Canal, submitted to Col. G. J. Lydeker, Corps of Engineers, U. S. A., his annual report of traffic through the United States and Canadian Canals at Sault Ste. Marie, for the season of 1901. Below are the most important and interesting figures:

The total freight traffic of 28,403,065 net tons is the maximum traffic in the history of the canals. It exceeds the traffic of 1900 by 2,759,992 tons, or 11 per cent. The total number of passengers was 59,663, an increase of 1,108, or 2 per cent. The season of navigation was open for a period of eight months and six days.

The American canal passed 25,582,038 freight tons, being an increase of 1,974,684 net tons over the year 1900, or 8 per cent.; the number of passengers was 29,701, a decrease of 6,612, or 18 per cent. as compared with 1900. The Canadian canal passed 2,821,027 freight tons, being an increase of 785,308 net tons, or 39 per cent. The number of passengers was 29,962, an increase of 7,720, or 35 per cent. as compared with 1900. Of the total freight the American canal passed 90 per cent. and 50 per cent. of the total number of passengers; the Canadian canal 10 per cent. and 50 per cent. respectively.

The total vessel passages through both canals numbered 20,041, as against 19,452 for the year 1900, an increase of 589, or 3 per cent.; the total lockages numbered 11,321, which is an increase of 636, or 6 per cent.

The American canal was opened April 26 and closed Dec. 11, 1901; season, 230 days. The Canadian canal was open 246 days.

The increased tonnage was general for all the principal items of freight with the exception of soft coal, copper and building stone.

The depth of water in channels permitted a safe draft of 17½ to 19 ft. during the season. Most of the 52 new vessels put in commission for the Lake Superior trade were large steam freighters, ranging from 375 to 450 ft. in length.

The growth of the Lake Superior commerce during the past half century has been phenomenal. The estimated amount and value of articles which crossed the portage at Sault Ste. Marie in 1851, to and from Lake Superior, was 12,600 net tons, worth $1,675,000. In 1861, a decade later, the traffic through the State locks was 88,000 tons, valued at $6 000,000; in 1871, 585,000 tons, estimated value, $13,000,000; in 1881, through the State and Weitzel locks, 1,567,741 tons at $30,000,000; in 1891, through Weitzel lock, 8,888,759 tons, at $128,178,208; in 1901, through Weitzel, Poe and Canadian locks, 28,403,065 tons, at $289,906,865. Thus, the average annual percentage of increase of each year's traffic over that of the preceding year has been as follows for the decades:

1851-1861	21	per cent.
1861-1871	21	" "
1871-1881	10¼	" "
1881-1891	19	" "
1891-1901	12¼	" "
Average	16⅔	" "

East and West Bound Commerce for the Season of 1901.

EAST BOUND.

Articles.	U. S. Canal.	Can. Canal.	Total.
Copper, net tons	86,903	11,698	98,601
Grain, bushels	22,051,033	2,653,021	24,704,054
Building stone, net tons	42,309	4,275	46,584
Flour, barrels	6,431,899	1,202,056	7,633,955
Iron ore, net tons	16,493,916	1,596,702	18,090,618
Iron, pig, net tons	21,683	8,662	30,345
Lumber, M ft. B. M	1,060,880	11,244	1,072,124
Silver ore, net tons	.....	.....	.....
Wheat, bushels	43,217,104	9,595,532	52,812,636
Gen'l merchandise, net tons	51,243	28,480	79,723
Passengers, number	13,828	15,135	28,963
WEST BOUND.			
Coal, hard, net tons	730,441	74,052	804,493
Coal, soft, net tons	3,352,752	435,891	3,788,643
Flour, barrels	165	230	395
Grain bushels	5,300	51,193	56,493
Manufactured iron, net tons	129,819	46,279	176,098
Salt, barrels	389,889	53,885	443,774
Gen'l merchandise, net tons	380,321	97,997	478,318
Passengers, number	15,873	14,827	30,700
Freight:			
East bound, net tons	20,930,117	2,157,625	23,087,742
West bound, net tons	4,651,921	663,402	5,315,323
Total freight, net tons	25,582,038	2,821,027	28,403,065
Vessel passages, number	15,837	4,204	20,041
Registered tonnage, net tons	22,222,334	2,404,642	24,626,976

Note.—In addition to the above traffic 10,100 cords pulp wood and 9,000,000 ft. pine logs passed over the rapids, bound for lower lake ports.

Freight to and from Each Lake.

East bound, from Lake Superior ports to:

	Net tons.
Lake Michigan ports	2,211,476
Lake Huron ports	917,919
Lake Erie ports	19,716,465
Lake Ontario ports	241,882
Total	23,087,742
West bound, from lower lake ports to Lake Superior:	
Lake Michigan ports	91,359
Lake Huron ports	187,517
Lake Erie ports	5,015,636
Lake Ontario ports	20,811
Total	5,315,323

Estimated Value of Freight Passing St. Marys Falls Canal and Sault Ste. Marie Canal, Season of 1901.

Items.	Quantity.	Price per unit.	Valuation.
Coal, anthracite, net tons	804,493	$5.60	$4,505,161
Coal, bituminous, net tons	3,788,643	2.90	10,987,065
Flour, barrels	7,634,350	3.25	24,811,637
Wheat, bushels	52,812,636	.69	36,440,719
Grain, oth. than wheat, bush.	24,760,547	.92	22,779,703
Manufactured iron, net tons	176,098	100.00	17,609,800
Pig iron, net tons	30,345	16.00	485,520
Salt, barrels	443,774	.75	332,830
Copper (refined and matte), net tons	98,601	266.00	26,227,866
Iron ore, net tons	18,090,618	3.25	58,794,509
Lumber, M. ft. B. M	1,072,124	15.50	16,617,922
Silver ore, net tons	.....	.....	.....
Building stone, net tons	46,584	12.00	559,008
Gen'l merchandise, net tons	558,041	125.00	69,755,125
Total			$289,906,865

Average value per ton of freight for season of 1901, $10.21.
Average value per ton of freight for season of 1900, $10.41.

Amount Paid for Carrying Freight.

Articles.	Quantity.	Rate per unit.	Amount.
Coal, net tons	4,593,136	$0.38	$1,745,391.68
Flour, barrels	7,634,350	.12	916,122.00
Wheat, bushels	52,812,636	.023	1,214,690.62
Grain, oth. than wheat, bu.	24,760,547	.022	544,732.03
Man'f'd iron, net tons	176.098	2.00	352,196.00
Pig iron, net tons	30,345	1.50	45,517.50
Salt, barrels	443.774	.15	66,566.10
Copper, net tons	98,601	1.65	162,691.65
Iron ore, net tons	18,090,618	.78	14,110,682.04
Lumber, M. ft. B. M	1,072,124	2.55	2,733,916.20
Silver ore, net tons	.....	.....	.....
Building stone, net tons	46,584	1.50	69,876.00
Gen'l merchandise, net tons	558,041	2.25	1,255,592.25
Total			$23,217,974.07

Total Freight, Its Valuation, Cost of Transportation, Average Length of Trips and Rate per Ton per Mile.

Year.	Total freight.	Valuation of Freight.	Total cost of Transportation.	Average Distance Freight was carried.	Cost of Transportation per mile-ton.
	Net tons.			Miles.	Mills.
1887	5,494,649	$79,031,757	$10,075,153.13	811.4	2.3
1888	6,411,423	82,156,019	7,883,077.40	806.4	1.5
1889	7,516,022	83,732,527	8,634,246.63	790.4	1.5
1890	9,041,213	102,214,948	9,472,214.90	797.2	1.3
1891	8,888,759	128,178,208	9,849,022.81	820.4	1.35
1892	11,214,333	135,117,267	12,072,850.88	822.4	1.31
1893	10,796,572	145,436,957	9,957,483.11	831.9	1.1
1894	13,195,860	143,114,502	10,798,310.28	821.1	.99
1895	15,062,580	159,575,129	14,238,758.02	830	1.14
1896	16,239,061	195,146,842	13,511,615.80	836.4	.99
1897	18,982,755	218,235,927	13,220,099.84	841.3	.83
1898	21,234,664	233,069,740	14,125,896.00	842.6	.79
1899	25,255,810	281,364,750	21,959,707.25	827.2	1.05
1900	25,643,073	267,041,959	24,953,314.71	825.9	1.18
1901	28,403,065	289,906,865	23,217,974.07	823.3	.99

American vessels carried 96 per cent. of the total freight and 28 per cent. of the total passengers. Of the 20,041 passages for the season, 3,719 were by 91 vessels under 100 tons register, or an average of 37 tons each. The total freight carried by such craft amounted to 1,858 tons.

Maximum Records Made by Vessels During the Season.

Name of Vessel and Maximum.	Amount.	Owners.
Steamer "Wm. Edenborn": Single cargo, tons	8,222	Pittsburgh St'mship Co.
Barge "Manila": Single cargo, tons	8,288	Pittsburgh St'mship Co.
Steamer "Presque Isle": Freight carried, tons	161,375	Cleveland Cliffs Iron Co.
Steamer "Buffalo": Miles run	41,370	N. Y. C. & H. R. R. Co.
Steamer "J. J. Albright": Mile-tons	132,822,226	Aetna Steamship Co.

The maximum traffic for a single day was on Sept. 2, when 230,156 freight tons were passed by 150 vessels, whose registered tonnage amounted to 202,525 tons. The minimum traffic for a single day was on April 24, when one ton of freight passed through the canals by nine vessels, whose registered tonnage amounted to 1,092 tons.

The American canal records show that vessels necessarily spent 25.042 hours and 34 minutes in canal or an average of 1 hour, 34 minutes and 52 seconds, which includes time waiting for lockage and passage through locks and canal, the latter being 1⅞ miles long. Other delays at canal, which included taking on supplies, waiting for daylight or favorable weather, amounted to 17,581 hours and 16 minutes.

General Summary.

Statistical summary of Lake commerce through canals at Sault Ste. Marie, Michigan and Ontario, for season of 1901:

Total mile-tons	23,383,861,987
Total freight carried, net tons	28,403,065
Total valuation placed on freight carried	$289,906,865
Average value per ton of freight carried	$10.21
Total amount paid for freight transportation	$23,217,974.07
Average distance freight was carried, miles	823.3
Cost per mile, per ton, mills	.99
Average cost per ton for freight transportation	$0.82
Total number of registered vessels using canals	893
Total number of passages by unregistered crafts carrying freight	413
Time American canal was operated, days	230
Time Canadian canal was operated, days	246
Total valuation placed on registered vessels	$60,556,100
Total number of passengers transported	59,663
Freight carried by:	
Registered vessels, tons	28,353,265
Unregistered vessels, tons	49,800
American vessels, per cent	96
Canadian vessels, per cent	4
Passengers carried by:	
American vessels, per cent	28
Canadian vessels, per cent	72

TECHNICAL.

Manufacturing and Business.

The C. W. Hunt Company, of West New Brighton, Staten Island, New York, has recently received an order from the United Railways & Electric Co., Baltimore, Md., for a set of electric hoisting machinery.

Jay G. Robinson will leave the employ of the Sargent Company April 1 to engage in railroad supply business. Mr. Robinson will be located in the Old Colony building, Chicago, adjoining the Sargent offices, and among other accounts will look after its interests in Chicago and vicinity as heretofore.

The United States Automatic Discharging Car Co. was incorporated in New Jersey, March 17, with $125,000 authorized capital. The incorporators are: Clarence G. McDevitt, Pompton Lake, N. J.; Aloysius Donnelly, 421 Park place, Brooklyn, N. Y.; Rose B. Weiss, 317 East Seventy-second street, New York city.

Among the orders recently received by F. M. Hicks, of the Hicks Locomotive & Car Works, are the following: Thirty rebuilt, 30 ft. stock cars for the Vera Cruz & Pacific R. R., Mexico; one passenger coach for the Munising Ry.; one combination passenger, mail and baggage car for the Chicago, Kalamazoo & Saginaw, and one ten-wheel, 40-ton locomotive for the Orange & Northwestern.

The John R. Morgan Engineering & Construction Company, Columbus, Ohio, recently incorporated, will build a plant to make cranes, elevating and handling machinery and ore hoisting and conveying machinery. The machine shop will be 240 by 100 ft.; the foundry, 250 by 100 ft., and the structural and erecting shop 250 by 100 ft. The officers of the company are: Edward Ackland, President; John R. Morgan, Vice-President and General Manager; Wm. G. Hildebran, Assistant Manager; Robert Bryson, Secretary; Gilbert D. Preston, Treasurer.

The Iroquois Machine Co., New York City, has been incorporated in New York State. The officers are: President, Edwin A. Smith, Providence, R. I.; Vice-President and General Manager, W. W. Gibbs, New York; Secretary and Treasurer, Henry C. Babcock, Providence, R. I. The principal office is at 150 Nassau street, New York. The Company will make new and improved wire drawing machinery, also a full line of automatic and plain drop hammers, swaging machines, rolling mills, roller bearings and grinding machines. It has bought the plant and business of the Universal Machine Co. at Providence and rented a large adjacent building. A new factory building will probably be built during the coming summer.

The metal surface cattle guard business seems to be taking on new life. The business of the Merrill-Stevens Manufacturing Co., Kalamazoo, Mich., is pointed to as an illustration. Last October the company moved from Niles to Kalamazoo, where a factory was built at the intersection of the Michigan Central, the Lake Shore & Michigan Southern and the Grand Rapids & Indiana Railroads. The main building is 100 x 40 ft. and of brick, two stories high. Its capacity is double that of the vacated Niles factory. The Company has its own electric plant for power, heat and light. Orders have been plentiful lately, the Company with its 35 employees is working full time, and a carload of steel is used every day. The new building will be enlarged this summer.

Iron and Steel.

It is said that the United States Steel Corporation has orders on its books for various kinds of finished products amounting to 6,000,000 tons.

The National Iron Co. of Gettysburg, Pa., has been incorporated in Delaware to make iron and steel from scrap. The capitalization is $125,000.

David Baker has been appointed General Manager of the Dominion Steel & Iron Co. at Sydney, Cape Breton, succeeding A. J. Moxham, recently resigned.

Contract for the steel to be used in connection with the elevation of tracks of the Pennsylvania Lines through Allegheny City, has been awarded to the American Bridge Co.

The American Bridge Co. has the contract for the deck plate girder bridge 568 ft. long for the Duluth, Missabe & Northern at Scott, Minn. It will consist of 64 ft. and 31 ft. spans.

The details for the new bond issue of the United States Steel Corporation will probably be announced in another week. It is said that $250,000,000 of bonds will be issued to cancel $200,000,000 of preferred stock.

According to a Montreal despatch, P. A. Peterson, consulting engineer of the Canadian Pacific Railway, has gone to Germany in regard to an order of 20,000 tons of rails which the company has placed there. It is said 10,000 tons have been placed with Krupp's at Essen, and 10,000 with the Bruchan's.

The Ohio Steel & Iron Specialty Company, of Cuyahoga Falls, Ohio, tells us that in the latter part of the year it expects to go into the manufacture of channels, tees and angles, and that the equipment for these will be ready some time in July. The company now makes light rails at the rate of about 75 tons a day.

The large blooming plant now being built by the Jones & Laughlins, Ltd., as an addition to its plant in Pittsburgh, will not be finished this spring, as had been expected. It will probably be late in the summer before the plant is put in operation. The company is also building a large open-hearth mill, which will have a capacity of 700 to 800 tons a day.

Wm. L. Elkins, Jr., son of Wm. L. Elkins, the street railroad promoter and capitalist, died at Ashburne, Pa., last Thursday. Mr. Elkins was associated with his father and P. A. B. Widener in many of their enterprises. He was President of the Pennsylvania Iron Works, the Otto Coke & Chemical Co., the Pittsburgh Gas & Coke Co., and a director in the Allis-Chalmers Co. and other concerns.

Report in Favor of the Metric System.

After hearings during which testimony was taken from a large number of representatives of leading manufacturers, tool and instrument makers, Government officials

and others interested, the Committee on Coinage, Weights and Measures of the lower House of Congress last week ordered a favorable report on the Shafroth bill, to adopt the weights and measures of the Metric System as the standard of weights and measures in the United States. The bill provides: "That after Jan. 1, 1904, all the departments of the Government of the United States in the transaction of all business requiring the use of weight and measurement, except in completing the survey of public lands, shall use only the weights and measures of the metric system, and after Jan. 1, 1907, the weights and measures of the metric system shall be the legal standard weights and measures of and in the United States."

Schoen's Rolled Steel Car Wheel Works.

Charles T. Schoen is said to be considering sites for his proposed plant to make rolled steel car wheels. The works, it is said, will probably be located in the vicinity of the Standard Steel Car Co.'s new plant at Beaver, Pa. Mr. Schoen in a recent interview is reported as saying that his new wheel is a success. He says: "In the United States there are 9,000 new car wheels used every day. My first plant will turn out 300 car wheels daily."

Pressed Steel Car Co.

The Pressed Steel Car Co. has begun action in the United States Circuit Court at Pittsburgh against John M. Hansen, its former Chief Engineer, to compel him to assign to it certain inventions made by him while in its employ. An order restraining Mr. Hansen from assigning or making use of his inventions has been granted by Judge Buffington, and a hearing will be given about April 1. The Pressed Steel Car Co. claims to have a monopoly under nearly 300 patents for the manufacture of steel cars, without the infringement of which, it is said, the Standard Steel Car Co., Mr. Hansen's company, cannot do business.

New York State Canals.

On March 18 the State Senate passed the Davis Canal bill, which proposes an amendment to the constitution for the expenditure of $31,800,000 for the improvement and enlargement of the Erie and Champlain Canals.

To Widen the Brooklyn Bridge Roadways.

Mr. Hildenbrand has proposed a plan to get additional width for the roadways of the Brooklyn Bridge. He would let the cables swing out to a vertical plane; and thus add 6½ ft. to each roadway to make its total 25½ ft., of which about 16 ft. would be assigned to the wagon way. This would allow teams to pass each other without turning on the car track which might then be cut off by a curb as was suggested by the Board of Expert Engineers. He thinks this change could be made for about $500,000.

Proposed Locomotive Works at Cornwall, Ont.

The U. S. Commercial Agent at Cornwall writes that a strong movement is being made to get the Deering and American Locomotive Company, of Chicago, to establish its plant at Cornwall. Twenty-five acres of land will be necessary, which will be readily supplied, as well as water power, exemption from taxes, etc.

A Turbine Yacht.

"Up to the present time the turbine has been applied to only four vessels by European shipbuilders—first to the torpedo-boat destroyer 'Turbinia,' then to the destroyers 'Viper' and 'Cobra,' belonging to the British navy, and, lastly, to the passenger steamer 'King Edward.' The first order received by any British shipbuilder for a turbine yacht has come from an American, Mr. A. L. Barbour, of New York. Messrs. Ramage & Ferguson, of Leith, are building this yacht to the design of Messrs. Cox & King, naval architects, London. She will be 252 ft. 3 in. in length on the water line and about 300 ft. over all, with 32 ft. 6 in. beam and a molded depth of 21 ft. The turbine machinery will not be materially different from that of the 'King Edward,' in which the high-pressure turbine is placed on the center shaft, carrying one propeller, and the two low-pressure turbines each drive one of the outer shafts, each of these shafts carrying two propellers. The 'King Edward' was described in the *Railroad Gazette* August 9 last.

"The yacht will have an indicated horse-power of 2,500, and the speed expected is 'not to be less than 16 knots.' In regard to the coal consumption the 'King Edward' on her trips last summer was fairly economical, but the 'King Edward' ran continuously at high pressure from Glasgow to Campbelltown and return, whereas a yacht on a cruise will steam at varying rates of speed. This turbine yacht will be completed in about ten months."

The foregoing is from consular reports by Mr. Rufus Fleming, stationed at Edinburgh. As noted in our issue of Feb. 28, page 151, there seems to be one turbine-and-engine equipped destroyer, named "Velox," not accounted for in the report.

New Equipment for the "Overland Limited."

Beginning March 31, the Chicago & North Western, the Union Pacific and the Southern Pacific expect to place entirely new cars in service on all of the trains of the "Overland Limited" run, between Chicago and California. The finishing touches are being put on the new cars at the works of the Pullman Company. Each train will include a baggage car, standard sleeping cars, a buffet smoking and library car, a dining car, and a compartment observation car. The trains will be lighted throughout with electricity from a small direct-current plant carried in the baggage car. The generating unit comprises a 25-h.p. Westinghouse engine, direct connected to a 125-volt six-pole dynamo. Current is supplied to storage batteries carried on the baggage car beneath the floor, from which distribution is made to the various cars. There are about 70 incandescent lamps in each sleeper and 40 in the buffet smoking car. The dining cars, observation cars and buffet smoking cars are each provided with two 12-in. electric fans. The sleeping cars have reading lamps in each section and room, and in the ladies' toilet room electric curling-iron heaters. The trains have a complete Pintsch gas equipment as an auxiliary to the electric system. The buffet, smoking and library car has a barber shop and a bath-room, a well-stocked buffet, and every convenience for smoking, reading and correspondence. The finish of the car is in mahogany, and the decorations in green and gold, with carpets to harmonize. The dining car has ten tables with a seating capacity for 30 people. Meals are to be served a la carte. The sleeping cars contain 14 sections and a drawing room. The interior finish is in Cuban mahogany with inlaid or marquetry work. The decorations are in light green and gold, and the carpets and upholstery sage green. The imperial ceiling of the car has very handsome combination gas and electric fixtures. The compartment cars are a new feature on these trains. Each has six compartments, a drawing-room and a large observation room. The compartments are fitted with folding wash-stands, and every toilet convenience. The finish is in Circassian walnut, English oak and Cuban mahogany. The drawing room is finished in white mohagany, with decorations in green and gold. The management has arranged for telephone service from the train while standing in the Chicago terminal, prior to departure. The instrument will be located in the observation car and prompt service is promised by the telephone company.

Demand for American Machinery in Belgium.

Consul Winslow writes from Liege, February 17, that the business outlook in that part of Belgium is much brighter, especially for American labor-saving machinery. The Consul has recently had many calls for addresses of American firms. There is an opportunity to furnish tools and machinery for an extensive rubber plant, as well as an outfit for a manufactory of enameled ware, communications in regard to which may be addressed to John Gross, rue Chevanfosse 13, Liege.

Oiling Apparatus for Locomotives in Sweden.

Consul R. S. S. Bergh has sent a description from a Gothenburg newspaper of a Swedish invention for oiling piston rods, cylinders, and guides on locomotives. It is by T. F. Malmros, of Gothenburg. Mr. Malmros, by introducing the intermixed oil and steam, coming from the central steam-lubricating apparatus, through glandular bushings expressly constructed for this purpose, has effected a good and economical lubrication of packings and rods, as well as of the cylinders and guides. The system has for five years been tested on the engines of the fastest train in Sweden, with such good result that all locomotives of the State railroads will be provided with it.

A Storage Battery Company.

The Consolidated Storage Battery Co. was incorporated in New Jersey on March 14. It will make and deal in electric motors, dynamos, storage batteries and all kinds of electric machinery. The incorporators are Frank H. Lord and George P. Holmes, of New York City, and Oscar L. Gubelman, of Jersey City.

THE SCRAP HEAP.

Notes.

The roadbed of the Galveston, Houston & Henderson, between Houston and Galveston, Tex., has been sprinkled with Beaumont oil.

The Wells-Fargo Express Co. has given to its employees silver medals commemorating the fiftieth anniversary of the establishment of the company, March 18, 1852.

A Chicago paper says that the Chicago, Burlington & Quincy will take off 24 of the 36 passenger trains now running each day between Chicago and Riverside, 11 miles. It is said that this is due to the extension of the Metropolitan elevated road to Lawndale.

Newspapers of Mississippi report that the enginemen and firemen of the Illinois Central have received a material increase in wages. On ordinary freight engines the runners have received an advance of 25 cents, from $3.75 to $4 per 100 miles; on heavy engines, from $3.85 to $4.25; light passenger engines, $3.35 to $3.50; heavy passenger, $3.45 to $3.60. Firemen receive 60 per cent. of the amounts paid to enginemen.

The Governor of Minnesota has instructed Attorney-General Douglas to begin proceedings in the State courts against the alleged merger of the Iron Range railroads. The bill will be filed soon and the United States Steel Corporation, which is reputed to own the stock of the Duluth, Missabe & Northern and the Duluth & Iron Range roads, will be made a party defendant. The Steel Corporation has an office at Duluth and the Governor expects that there will be no difficulty in reaching it through the State courts.

The strike of freight handlers in Boston was settled on Saturday last. So far as the railroads were concerned, the strikers appear to have lost the battle, as large numbers of new men were engaged and the strikers who were taken back appeared to have been taken as new men; and the reports indicate that a considerable percentage are still out in the cold. The agreement of the strikers to return to work without any concession on the part of the employers, is said to have been brought about by a promise of the Governor of the State to use his influence to induce the New York, New Haven & Hartford to adopt a rule relieving its freight house men from the duty of assisting teamsters in unloading freight from wagons. The Boston & Maine does not require this duty of its men. The officers of the New Haven road take pains to state, however, that they have made no change in their requirements; if a teamster has an unusually heavy piece of freight, the freight-house men must help him. The strike was so extensive, involving some stoppage of traffic at all of the freight stations in the city, both railroad and steamboat, and affecting manufacturers, hotels and many other important interests, that the public agitation was unusual, and both the Governor of the State and the Mayor of the city appear to have found it expedient to take very vigorous measures.

Traffic Notes.

The Baltimore & Ohio will henceforth give no stopovers on local tickets.

Ohio newspapers say that the railroads carrying coal from the Ohio, Pennsylvania and West Virginia mines to Lake Erie have advanced rates two cents a ton. The basis is 73 cents from Pittsburgh, or for fuel coal 80 cents and commercial coal 90 cents. The Ohio railroad officers do not seem to share the fears of imprisonment which are said to agitate the breasts of traffic men at Chicago.

Trenton (N. J.) newspapers report that an embargo of two months on the coal trade of that city has just been raised by the settlement of a disagreement between the Lehigh Valley and the Pennsylvania concerning the interchange of coal cars. The Lehigh Valley complained that the Pennsylvania did not return empty cars to the mines with sufficient promptness; and, according to the reports, it was obliged to enforce its claim by refusing to send its own cars on the Pennsylvania Lines.

Press despatches say that the Interstate Commerce Commission has ordered the railroads west of Chicago to lower their freight rates on live stock to the same basis as the rates on provisions. The recent cut of five cents on packing house products, it is said, must be abrogated. It is said that there is much consternation among traffic officers because of this order; but in view of the fact that it is just as lawful as ever to disregard an order of the Interstate Commission requiring a change in published rates, it is not exactly clear why traffic men should be particularly disturbed just now.

London & North Western.

The London & North Western Railway Co.'s (England) report for the six months ending Dec. 31, 1901, shows income from all sources of $36,179,016, an increase of $168,725, compared with the corresponding period of 1900. The working expenses aggregated $22,127,901, a decrease of $159,452. Rents, leases and interest on debenture stock are responsible for the disbursement of $3,362,114, leaving a total (including balance brought forward from previous report) of $10,848,983 available for dividends. Dividends of 2 per cent. on the guaranteed and preference stocks, and 3¼ per cent. on the consolidated stock have been declared, requiring the sum of $10,482,777, leaving a balance carried forward of $366,206. These rates of interest correspond exactly with those declared for the December 1900 half-year. For the whole year 1901 4 per cent. per annum has been paid on the guaranteed and preference stocks, and 5½ per cent. per annum on the Consolidated stock. The passengers carried during the six months were 45,822,290, a decrease of 305,622 passengers; the total tons of freight was 21,849,688, an increase of 21,115 tons. The mileage of passenger trains was 14,233,634 miles, an increase of 250,167 miles; the mileage of freight trains was 10,676,662 miles, a decrease of 692,353 miles. The finance figures are computed at the rate of $4 86, equal the pound sterling.

New 16-Inch Army Gun.

The work of assembling the new 16-in. army gun for coast defense has been completed at the Watervliet Arsenal, and the gun is practically ready for testing at Sandy Hook. The gun, which is 49 ft. $2^{9}/_{10}$ in. long, 5 ft. in diam. at the breech and 2 ft. 4 in. in diam. at the muzzle, will be mounted on a disappearing carriage. The gun consists of a long inner tube, a heavy jacket extending from the breech to about 6 ft. beyond the trunnions, the chase hoops extending from the jacket to the muzzle and the jacket hoops enclosing the jacket and extending from the breech about half the length of the gun. The forgings for the gun weigh about 300,000 lbs., and the projectiles will be 5 ft. 4 in. long.

Manchester-Liverpool Service.

The Lancashire & Yorkshire Railway of England has in the last few months quickened the Manchester and Liverpool service so that the fastest trains now take only 40 minutes for the 36 miles, a speed of 54 miles an hour. This time is now the same as that taken by the other lines with their shorter routes. This company has on this section grades of 1 in 80 and 1 in 100, so that the performance is good and the time kept is reported to be excellent.

A Dinner to Mr. C. C. Martin.

Many friends of Mr. C. C. Martin joined in giving him a dinner at the Montauk Club in Brooklyn last Saturday evening. Mr. Martin was Chief Engineer of Prospect Park, Brooklyn, in the sixties; Principal Assistant Engineer on the Brooklyn Bridge 1870 to 1883, the whole period of its building; Chief Engineer and General Superintendent 1883 till a few weeks ago, when he retired from active duty with the title of Consulting Engineer. The dinner was attended by about 200 and included many of the most distinguished and representative men of Brooklyn. It was a grand tribute to the worth and devoted public service of this modest and able man. Nothing could have been more complimentary and appreciative than the feeling of the assembly. The speakers were Mr. Berri, formerly Bridge Commissioner of Brooklyn; Mr. Boody, formerly Mayor of Brooklyn; Mr. Pront, editor of the *Railroad Gazette;* Mr. Scott, President of the Union Iron Works, San Francisco; Martin Littleton, Richard Young, and William C. Redfield. Mr. O. F. Nichols was chairman and toastmaster. At the beginning of the speaking Mr. Martin was presented with a handsome bronze.

The Irrigation Bill.

The irrigation bill as passed by the United States Senate and favorably reported in the House of Representatives provides that all moneys received for the

sale of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North and South Dakota, Oklahoma, Oregon, Utah, Washington and Wyoming, from July 1, 1902, shall be spent in building irrigation works for the reclamation of arid lands, the work to be done and the money spent under the direction of the Secretary of the Interior. The 16 States mentioned contain about 535,000,000 acres of land still subject to entry, all but 10,000,000 acres of which require irrigation to become productive. So far, about 7,500,000 acres of land have been irrigated in the United States. It is estimated that the bill now reported in the House will produce a fund of from $2,000,000 to $2,500,000 a year.

LOCOMOTIVE BUILDING.

The Denver & Rio Grande is having 10 locomotives built at the Baldwin Works.

The Colorado Fuel & Iron Co. is having two locomotives built at the Baldwin Works.

The New York Central & Hudson River is reported to have ordered 10 switch engines from the Cooke Works.

The Boston & Maine is having six locomotives built at the Schenectady Works of the American Locomotive Co.

The Minneapolis, St. Paul & Sault Ste. Marie is having three locomotives built at the Schenectady Works of the American Locomotive Co.

The Vandalia order reported in our issue of March 7 calls for four mogul and four 6-wheel simple locomotives. Weight of moguls on drivers 130,000 lbs., total weight 150,000 lbs.; diameter of cylinders, 20 in.; stroke of piston, 26 in.; diameter of drivers, 62 in.; wide fire-box boiler; working steam pressure, 185 lbs.; 310 tubes, outside diameter, 2 in.; length of fire-box, 100 in.; width, 63½ in.; tank capacity, 7,000 gallons of water. The 6-wheel engines will weigh 120,000 lbs. on drivers, total weight, 120,000 lbs.; diameter of cylinders, 19 in.; stroke of piston, 26 in.; diameter of drivers, 50 in.; straight boiler; working steam pressure, 180 lbs.; 259 tubes, 2 in. in diameter; length of fire-box, 102 in.; width, 33 in.; tank capacity, 5,000 gallons of water: Special equipment for both mogul and 6-wheel engines includes Westinghouse air-brakes; Tower couplers; Sellers R. S. and Monitor L. S. injectors; U. S. metallic piston rod and valve packings; Coale's safety valves; Leach sanding devices; P. R. R. steam heat equipment and cast steel wheel centers.

CAR BUILDING.

The Rutland has ordered 450 box cars from the American Car & Foundry Co.

The Louisiana & Arkansas is having 50 freight cars built by Barney & Smith.

The American Car & Foundry Co. is building 503 cars of various types for miscellaneous parties.

The Southern Pacific has ordered 200 refrigerator cars from the American Car & Foundry Co.

The Maryland & Pennsylvania is having four coaches built at the Wilmington Works of the American Car & Foundry Co.

The Interoceanic of Mexico has ordered 40 box cars, 20 stock cars and 20 flat cars from the American Car & Foundry Co.

The New York Central & Hudson River has ordered 300 refrigerator cars from the Merchants Despatch Transportation Co.

The Chesapeake & Ohio, it is reported, has placed an order for 1,000 coal cars with the Standard Steel Car Co., of Pittsburgh.

The St. Louis, Kansas City & Colorado has ordered 50 convertible ballast, coal, and flat-bottom gondola cars from the Rodger Ballast Car Co.

The International & Great Northern has placed an order with the American Car & Foundry Co. for 100 tank cars of 80,000 lbs. capacity. The cars will weigh 33,000 lbs., and will be 34 ft. 10½ in. long; 8 ft. 10 in. wide; 10 ft. 11½ in. high. Wooden underframes, iron axles, wrought iron bolsters; National brake-beams; cast iron brake-shoes; Westinghouse brakes; M. C. B. phosphor bronze brasses; Tower couplers; Harrison dust guards; malleable iron journal boxes; McCord lids; Patterson-Sargent Co.'s paint; French springs and I. & G. N. standard American Steel Foundry Co.'s trucks.

BRIDGE BUILDING.

ALLENTOWN, PA.—The Allentown & East Allentown Bridge Co. has applied for a charter for the building of a bridge over the Lehigh in this city.

AMITE CITY, LA.—The Police Jury has appropriated $5,000 for a steel bridge across Tangipahoa River at Davis' Ferry. The contract will be let at the May meeting.

ARKANSAS.—The U. S. Senate has passed the bill authorizing the Eldorado & Bastrop Ry. to build a bridge across the Ouachita River, in Arkansas.

A bill was introduced into the U. S. Senate on March 6 authorizing the White River Ry. Co. to build a bridge across White River in Arkansas.

ATLANTA, GA.—Bids are wanted April 7 by the clerk of the City Council for building the steel viaduct over the tracks of the Southern, the Atlanta & West Point and the Central of Georgia railroads at Peters street. The total length of the structure, including approaches, will be 1,000 ft., of which 566 ft. will be of steel work. Plans are with R. M. Clayton, City Engineer.

BALTIMORE, MD.—Both branches of the Maryland Legislature have passed a bill authorizing the Dundalk, Sparrows Point & North Point Electric Ry. to build a bridge over Bear Creek.

BERRYVILLE, VA.—A bill is before the State Senate authorizing the Supervisors of Clarke County to build a bridge over Shenandoah River.

BOSTON, MASS.—Robert T. Johnson has a petition in the Legislature for permission to build a bridge over Fort Point Channel at I street in South Boston.

BRATTLEBORO, VT.—The town has appointed a committee to get information regarding a steel bridge to span the Connecticut River to replace the present structure. Probable cost, $25,000.

BRISTOL, ME.—It is reported that this town contemplates building a new highway bridge.

BUCYRUS, OHIO.—The Ohio Central Traction Co. proposes to build new bridges along its lines, removing the wooden structures.

BURLINGTON, IOWA.—The House of Representatives on March 7 passed a bill extending the time for the construction of a bridge by the Citizens' Bridge Co., across the Mississippi River, at or near Burlington, Iowa.

BURLINGTON, KAN.—Bids are wanted April 8 for some steel bridges. W. M. Palen, County Clerk.

CAMBRIDGE, MD.—A bill has been introduced in the State Senate for a bridge across Cabin Creek in Dorchester County.

CASTOR, VA.—The contract for the bridge near Hurt has not yet been let. The county will have to raise additional funds and get new bids. C. L. Demott, of Lynchburg, is Consulting Engineer.

CEDAR RAPIDS, IOWA.—The city has let the contract for the Avenue A viaduct to the Chicago & North Western Ry.

CENTERVILLE, IOWA.—Bids are wanted April 8 by the Board of Supervisors for all bridges to be built during the year. A. E. Tucker, Chairman of the Board.

CHARLESTOWN, N. H.—The town is considering building a bridge at Metcalf's Mills.

CHICAGO, ILL.—Bids are wanted until noon of March 27 at the U. S. Engineer Office, 1637 Indiana avenue, for six riveted steel highway bridges over Illinois & Mississippi Canal.

CINCINNATI, OHIO.—The following are the bids on Spring Grove avenue bridge superstructure: Variety Iron Works, $35,872; Brackett Bridge Co., $33,900; Champion Bridge Co., $34,875; Illinois Bridge Co., $33,990; Canton Bridge Co., $36,300; Huston & Cleveland, $33,567.

The bids on the St. Clair street bridge superstructure were from $13,600 to $11,600 by the same companies.

CLARKSVILLE, VA.—An election will be held April 22 to vote on an issue of $10,000 of bonds for part payment of a bridge over Roanoke River by the Clarksville Toll Bridge Co.

COLUMBUS, GA.—Bids are wanted April 22 for building the superstructure of a bridge over Chattahoochee River at Fourteenth street. The bridge will be 715 ft. long, to consist of five equal spans, each about 140 ft. 8 in. long. Address Robert L. Johnson, Superintendent of Public Works.

It is reported that the County of Muscogee will build a few iron and steel highway bridges. Address Wm. Redd, Jr., Ordinary, Columbus, Ga.

COLUMBUS, OHIO.—Bids are wanted April 9 by L. E. Jones, County Auditor, for the substructure and superstructure of 11 bridges.

CRAWFORDSVILLE, IND.—Bids are wanted April 8 for building several county bridges. Jas. A. Harding, County Surveyor.

CROOKSTON, MINN.—Bids are wanted April 10 for a 200-ft. and two 40-ft. bridges on Main street over Red Lake River. Address Geo. A. Ralph.

DALTON, MASS.—It is said bids will be wanted on the 22d for the bridge to be built at the Center. The estimated cost is $13,700. H. L. Norton, of Springfield, is the Engineer.

EGLINTON, ONT.—The Township Council has ordered the Engineer to get bids for a steel bridge over Don River.

ELIZABETH, N. J.—The City Council is considering the advisability of building a bridge on Crane street.

EL PASO, TEXAS.—A bill is before Congress to permit a dam across the Rio Grande at El Paso. W. W. Follett is Engineer. Such a dam would cost about $2,000,000.

EUFAULA, ALA.—The county officers are considering rebuilding seven bridges.

FARMDALE, FLA.—The House of Representatives passed a bill on March 10 authorizing the Dothan, Hartford & Florida Ry. (now building) to build a bridge across East St. Andrews Bay, about one mile east of Farmdale, subject to the regulation of the Secretary of War.

GRAND FORKS, N. DAK.—The County Commissioners are considering plans for building some bridges.

GRAND ISLAND, NEB.—The Union Pacific has been asked to build a subway under the tracks at Pine street.

GREENFIELD, MASS.—It is stated negotiations between the cities of Greenfield and Deerfield and the Greenfield & Deerfield Street R. R. are discontinued. The railroad company will go ahead and build an independent bridge, leaving the towns to provide a new bridge for their own use.

HARRISBURG, PA.—Mayor Fritchey has signed the ordinance providing for building the Herr street subway.

The State will have to bear a big bill for rebuilding the inter-county bridges destroyed by the late flood. The Dauphin County Court this week appointed viewers for the following bridges: Over the Tunkhannock River in Wyoming County; over the Susquehanna River in Wyoming County; over the Lehigh River near Easton; over Tuscarora Creek in Juniata County; at Old Forge, Lackawanna County.

INDIANAPOLIS, IND.—It is said that bids will be wanted soon for the bridge over White River at West Washington street, and that estimates are wanted on all kinds of bridges. The city is to decide later what kind of bridge is to be built.

KANSAS CITY, MO.—A bill has been passed by the U. S. Senate and House of Representatives authorizing the Chicago, Rock Island & Pacific Ry. to build a bridge across the Missouri River.

KINNIKINNICK, OHIO.—The Norfolk & Western, according to report, will build an overhead bridge in this town.

KNOX, IND.—Bids are wanted April 7 by the County Commissioners for a bridge at Robbins Ditch.

LAFAYETTE, IND.—The County Commissioners have rejected the bids for the Brown street bridge. New bids will probably be wanted early in April.

LAMAR, MO.—Bids are wanted April 7 by J. W. Hagny, County Surveyor, for a steel bridge over Drywood, two miles east of Oskaloosa.

LEHIGHTON, PA.—The East Side Land Co. is back of a company now forming with $40,000 capital to bridge the Lehigh River at some point between here and Packerton.

LITTLE FALLS, MINN.—The contract for the substructure of the bridge over the Mississippi at this city is let to Harris & Mecusker, of Little Falls. F. W. Cappelin, Consulting Engineer, Minneapolis.

MANHATTAN, KAN.—Bids are wanted April 9 for some bridge work for the county. Address C. M. Breese, County Clerk.

MANILA, PHILIPPINE ISLANDS.—It is said that a rolling lift bridge will be built here, and that bids will be wanted about May 1. A. L. Davies is Secretary of the Municipal Board.

MORGANTOWN, W. VA.—The U. S. Senate has passed the bill previously passed by the House of Representatives, authorizing the Central Ry. of West Virginia to build a bridge across the Monongahela River.

NEVADA CITY, NEV.—Bids are wanted April 9 by Sidney Beard, City Clerk, for a steel bridge over Deer Creek.

NEWARK, N. J.—The Lackawanna R. R. will build a bridge in Fifth avenue at Thirteenth street (Roseville), over the tracks of the Montclair Branch.

President Truesdale, of the Delaware, Lackawanna & Western, says that during the past two years his road has built more than two miles of steel bridges aggregating about 26,000 tons of material. The cost of this work is about $2,100,000, and plans have been made for an additional expenditure of more than $2,000,000 to cover a period of three years.

NEW CASTLE, PA.—The Grand Jury has recommended that the county build a bridge over Jamieson Run in Plaingrove Township.

NEW YORK, N. Y.—The State Assembly has passed a bill authorizing the city to finish the bridge over Bronx River at Westchester avenue.

NORFOLK, VA.—The Elizabeth Park & Land Co. will build a drawbridge across Broad Creek to be about 1,000 ft. long. James W. McCarrick, President.

OMAHA, NEB.—The House of Representatives on March 8 passed a bill authorizing the South Omaha Railroad & Terminal Co. to build a bridge and approaches across the Missouri River. The South Omaha Pontoon & Ferry Co. has made an agreement with the former company in regard to the bridge.

PARKVILLE, MO.—The U. S. Senate on March 10 passed the bill authorizing the Kansas City, Northeastern & Gulf Railway to build a bridge across the Missouri River, at or near Parkville. The main channel spans are to be not less than 400 ft. in the clear at low water, all other spans not less than 300 ft. in the clear. If built as a drawbridge it is to be a pivot draw with one or more draws, as the Secretary of War directs. Work on the bridge must be begun within two years, and be finished within four years from date of the approval of the Act.

PATERSON, N. J.—The Board of Freeholders will soon take action to rebuild 12 bridges that have been destroyed. It will cost $45,000 to repair Ackerman avenue bridge, and $30,000 for the Passaic drawbridge.

PHILADELPHIA, PA.—A survey committee of the Councils has taken favorable action on the ordinance authorizing the Pennsylvania R. R. to build a 110-ft. extension to Spring Garden street bridge.

Chief Engineer Webster, of the Bureau of Surveys, says that $2,000,000 could be advantageously expended in building bridges in Philadelphia. He mentions a large number of places where bridges are needed, most of them being at railroad crossings.

PITTSBURGH, PA.—A resolution to authorize the contract for building the Wilmot street bridge across Junction Hollow is before the Councils. It specifies that the bridge shall not cost more than $195,000, and that it be of steel with stone piers and be 40 ft. wide. The plans have been made for over two years. Address J. Guy McCandless, Director of Public Works.

The contract for rebuilding the South Tenth street bridge has been let to the American Bridge Co. at $248,000, less $4,000 allowed for the material in the present structure.

POTTSVILLE, PA.—The County Commissioners estimate the number of bridges destroyed or rendered unfit for service by the flood of February 28 at 50, and the monetary loss at about $30,000.

RIVER JUNCTION, FLA.—The Louisville & Nashville is about to rebuild its trestle over the Apalachicola River. It will be about one mile long.

ST. LOUIS, MO.—The Louisiana Purchase Exposition Co. will soon want bids for a steel bridge.

SALEM, OHIO.—The Pennsylvania Co., according to report, proposes to build a viaduct over the tracks on West Main street.

SAVANNAH, GA.—On March 8 the House of Representatives passed the bill authorizing a bridge across the Savannah River from the City of Savannah to Hutchinson Island.

SEDGWICK, ARK.—The Tyronza Central (St. Louis & San Francisco) will need a bridge over Little River. See Railroad Construction column.

SOUTH BEND, IND.—We are told that the Terre Haute & Indianapolis R. R. has made an agreement with the city whereby a viaduct will be built over Elmira street, under certain conditions which may or may not arise.

STRUTHERS, OHIO.—The Penn Bridge Co. has the contract for the plate girder bridge over the Pittsburgh & Lake Erie at Struthers at $25,000.

SYRACUSE, N. Y.—Estimates have been made by the City Engineer for a bridge over Harbor Park.

A bill is before the Assembly for a new bridge over Oswego Canal at North Salina street.

TERREBONNE QUE.—The Government is asked to contribute $20,000 promised in 1888 toward a bridge over the River Jesus between Terrebonne and St. Francois de Salle. The bridge will cost $50,000 and the balance of the cost will be paid by the municipalities interested. H. Desjardins is Mayor of Terrebonne. Others interested are H. Masson and J. Masson.

WESTMORELAND, KAN.—Bids are wanted April 9 by the Board of County Commissioners for a steel bridge over Carnahan Creek. A. P. Scritchfield, County Clerk.

WILLIAMSPORT, PA.—The March Grand Jury has approved petitions for bridges over Pine Creek and Slate Run in Brown Township; over Mill Creek near Montoursville; over Muncy Creek near Picture Rocks; over McClure's Run in Loyalsock Township; over Loyalsock Creek in Upper Fairfield. Petitions for three bridges over Susquehanna River at Montgomery, and over South Creek in Washington Township, were reported adversely. The total cost of bridges asked for reaches $100,000.

Winnipeg, Man.—The Canadian Pacific, it is said, will build a subway under the tracks at Main street.

Urbana, Ohio.—The Urbana, Mechanicsburg & Columbus Electric Ry. will build a bridge over the tracks of the Big Four at the foot of West Church street.

Other Structures.

Altoona, Pa.—It is said that the Altoona and Juniata shops of the Pennsylvania will be greatly improved this year. Considerable new machinery will be added to both shops.

Augusta, Ga.—The Augusta Union Station Co. wants bids until 10 o'clock, March 25, for building the union station, according to plans made by Architect Frank P. Milburn, of Columbia, S. C.

Bloomington, Ill.—It is stated that plans for a union depot for the Big Four and the Lake Erie & Western are being made.

Bridgeport, Conn.—The machine shop of the Farist Steel Co. on East Main street was destroyed by fire, March 15, causing a loss of $40,000.

Canton, Ohio.—The foundry of the Novelty Iron Works was destroyed by fire about a week ago.

Chattanooga, Tenn.—The Southern Ry. has notified the City Clerk that plans for the new $5,000 station shed for this city are made and that bids are being received.

Cleveland, Ohio.—The Cleveland Crane & Car Co. is building a new shop at Wickliffe to be 100 x 170 ft. The steel work is let to T. H. Brooks & Co.

Chicago, Ill.—The Illinois Car & Equipment Co. at Hegewisch is building a malleable casting plant of 20 tons daily capacity.

East St. Louis, Ill.—The St. Louis Steam Forge & Iron Works will build a plant in East St. Louis to make car axles.

Elwood, Kan.—A 20-stall roundhouse will be built at Elwood for the Chicago, Rock Island & Pacific.

Fort William, Man.—The Canadian Pacific has decided to increase its elevator capacity at Fort William from 5½ million bushels to 8 or 9 million bushels, and it is said that plans are being made.

Harrisburg, Pa.—The directors of the Central Iron & Steel Co. have authorized the erection of four large open-hearth steel furnaces.

Hoosick Falls, N. Y.—The Boston & Maine will build a new station here.

Indianapolis, Ind.—It is said that the Big Four is negotiating for land on which it will build a large freight depot, extending from Jackson to Brown streets.

Kansas City, Mo.—It is said that a local firm is making plans for the proposed union passenger station in the West bottoms.

Lexington, Ky.—The Lexington & Eastern Ry. will build a new station in this city.

Lima, Ohio.—Plans have been made by the Osborn Engineering Co. for the new plant to be built by the Lima Locomotive & Machine Works.

Los Angeles, Cal.—It is stated that the Southern Pacific Co. contemplates building a new passenger station in Los Angeles.

Louisville, Ky.—The Louisville Bolt & Iron Co. has decided to rebuild at once its plant which was destroyed by fire about a month ago. It will cost about $200,000 to do the work.

Monaca, Pa.—Plans are being made by the Colonial Steel Co. for further additions to the mills now building. The puddling department is now in operation, with 10 furnaces. It is stated that 18 furnaces are to be the total number installed there.

The Kidd Bros. & Berger Steel Co. contemplates building a crucible steel plant above the plant of the Colonial Steel Co.

Nashville, Tenn.—The Tennessee Central has let a contract for a freight and passenger station on Front street, near Broad, to Moody & Vaughn, of this city.

New Castle, Pa.—The Pittsburgh & Lake Erie, according to report, will make some extensive improvements at New Castle Junction. A new passenger station is part of the work. The Baltimore & Ohio is also expected to make improvements at this point.

Pensacola, Fla.—It is stated that the Louisville & Nashville contemplates building a car building plant at Pensacola; also that the company will build coal chutes at Flomaton; also a two-story passenger station at the latter place.

Petoskey, Mich.—It is again reported that the Grand Rapids & Indiana will build a passenger depot at Petoskey. It is now said that work will begin in the spring.

Pittsburgh, Pa.—The Westinghouse Machine Co. has let contracts to the Cambria Steel Co., of Johnstown, for the large new pattern shops and gray iron foundry to be built at Trafford Park. James Stewart & Co. will build the remainder of the buildings. The new plant, with equipment, will cost over $1,000,000. The new works will concentrate two of the present foundries operated by the Westinghouse Machine Co. Further additions to provide for the Westinghouse Electric & Mfg. Co. will be made in the future.

St. Paul, Minn.—The Chicago, St. Paul, Minneapolis & Omaha will soon begin work on its new freight station in this city, which will cost about $50,000.

Shousetown, Pa.—The United States Wire & Nail Company, of Pittsburgh, is planning to extend its facilities at Shousetown. Plans have been drawn for a billet mill at an estimated cost of $500,000. The company contemplates an increase in the capital stock to provide for the extensions and improvements.

Sioux City, Iowa.—President Hughitt, of the Chicago & North Western, is reported as saying that the new depot to be built at Sioux City will be on the site of the present Sioux City & Pacific depot in that city. Plans of the building will be on inspection at the office of the architects, Messrs. Frost & Granger, in Chicago, this week.

Toledo, Ohio.—It is said that not less than $100,000 will be spent by the Cincinnati, Hamilton & Dayton on dock improvements this spring. A rapid unloading machine to cost about $60,000 will be erected.

The Wilks Foundry Co. has broken ground for its new plant on Woodville street.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xix.)

Air-Brake Association.

The Secretary of the Air-Brake Association has issued a circular regarding the ninth annual convention of this Association to be held at the Monongahela House, Pittsburgh, Pa., beginning April 29. The special rates at this hotel, American plan, will be $3 a day and upward for one person, and $2.50 a day and upward for each of two persons occupying a single room.

Richmond Railroad Club.

A regular monthly meeting of the Richmond Railroad Club was held at the rooms of the Railroad Y. M. C. Association, Main street station, March 13, at 8 o'clock p. m. The paper for discussion was "Tunnel Ventilation," by Mr. C. S. Churchill, Engr. M. of Way, N. & W. Railway, Roanoke, Va.

The subject of Standard Train Orders was brought up for discussion by Mr. C. H. Hix, Superintendent, S. A. L. Railway.

National Association of Manufacturers.

The seventh annual convention of the National Association of Manufacturers will be held in Indianapolis, Ind., April 15, 16 and 17. Arrangements are being made by a committee of Indianapolis business men under the direction of Mr. D. M. Parry. President Theodore C. Search, who has held office for six years, has announced that he cannot serve the Association any longer in that capacity. During Mr. Search's presidency the membership of the Association has increased from less than 200 to more than 1,000, and a vast amount of work has been done to promote the interest of manufacturers of the United States.

Southern & Southwestern Railway Club.

The next meeting of the Southern & Southwestern Railway Club will be held at the Kimball House, Atlanta, Ga., at 10 o'clock a. m., Thursday, April 17. Subjects for discussion as follows: "Most Economical Form of Locomotive Grates for Southern Coal," W. E. Symons, T. D. Kline and A. J. Dunn, committee; "M. C. B. Rules and Recommendations," J. S. Chambers, R. P. C. Sanderson and Pulaski Leeds, Committee; "Steam Heat vs. Stoves, Cost to Maintain, Etc.," J. R. Lane, L. B. Rhodes and W. E. Chester, Committee; "Locomotive Trackage; the Best Modes of Keeping in Line, Etc.," W. L. Tracy, J. B. Michael and C. F. Thomas, Committee.

Canadian Railway Club.

The formal organization of the Canadian Railway Club was effected at a meeting at the Windsor Hotel in Montreal on March 11. The meeting was attended by about 150 railroad men, and about 175 names were enrolled. Montreal will be the headquarters of the club. Officers were elected as follows: President, E. A. Williams, Superintendent of Rolling Stock, Canadian Pacific; Vice-President, T. McHattie, Master Mechanic, Grand Trunk; Second Vice-President, S. King, Master Car Builder, Intercolonial. The Executive Committee consists of W. H. Rosevear, Jr., James Powell, Acton Burrows, F. H. Hopkirk and F. Sutherland. S. Underwood, of the Great Trunk, is temporary Secretary and Treasurer. The next meeting of the club will be held in Montreal April 22.

The Engineers' Club of Philadelphia.

A regular meeting of the club was held on Saturday, March 15, 1902, at 8 o'clock p. m. The paper was "Remarks on the Recent Conflagration at Paterson, N. J." Illustrated. By Wm. Copeland Furber.

A stated meeting was held March 1; 84 members and visitors present.

Mr. John Birkinbine apologized for keeping the meeting waiting for his arrival, the delay having been due to his difficulty in returning to Philadelphia from Easton on account of the flooded condition of the Lehigh River. In view of the engineering interest which these unusual conditions of our streams must have, he moved that his paper upon "Changes in the Manufacture of Pig Iron" should be postponed in order that a general discussion might be held upon the influence of flood conditions in stream discharge. This motion was duly carried, and Mr. Birkinbine opened the discussion by describing the conditions which he had found at Easton, Pa., on February 28th, and comparing them with the high-water records of that locality for previous years, and also with the high-water conditions which prevailed at Johnstown, Pa., before the failure of the South Fork dam, in 1889. Mr. L. Y. Schermerhorn called attention to the usual overestimate of the velocity of flow in streams, and suggested that the overflow of affluents could be prevented by building obstructions in all the tributaries. Mr. John E. Codman described the flow-off into the Neshaminy Creek, Philadelphia, in accordance with measurements made February 28th. He stated that the run-off through streams seldom equals one-half of the rainfall over the drainage area, and cited measurements and computations made in support of the statement. Mr. E. M. Nichols described an overflow in the State of Arkansas, when the Mississippi rose four feet and flooded forty miles of adjacent country.

PERSONAL.

—The reappointment of Mr. George W. Dunn as Railroad Commissioner of the State of New York has been confirmed. Mr. Dunn is also Chairman of the State Republican Committee. He has been a railroad commissioner since 1897.

—Mr. C. M. Stanton, General Manager of the Jacksonville & St. Louis, died at Citronville, Ala., March 8. Mr. Stanton's railroad work dated from 1864, when he started as a telegraph operator. He had been General Manager of the Jacksonville, Louisville & St. Louis, and its successor, the Jacksonville & St. Louis, since 1894.

—Mr. C. H. Hogan, Master Mechanic of the New York Central & Hudson River, who was recently transferred to the New Durham shops with supervision over the River and Mohawk Division of the West Shore, began his railroad service with the Central in 1871 as an engineman. Mr. Hogan became traveling engineer in 1893, and in December of the same year became road foreman of engines. In 1900 he was appointed Master Mechanic of the Western Division.

—Mr. W. C. Ennis, the new Master Mechanic of the Central New England, was connected with the New York, Susquehanna & Western until it was consolidated with the Erie. He then went to the Rogers Locomotive Company of Paterson, and remained there until the works closed. From this position Mr. Ennis went to the Delaware & Hudson, leaving this company after one year's service to take a position in the purchasing department of the American Locomotive Company.

—The new General Superintendent of the Chicago Great Western, Mr. George A. Goodell, is a native of Illinois, having been born at Knoxville in 1855. In 1868 Mr. Goodell began his railroad service as a messenger boy on the Chicago, Burlington & Quincy. In 1876 he went to the Toledo, Peoria & Warsaw as ticket agent, and the following year (1877) he became a telegraph operator on the Burlington, Cedar Rapids & Northern. Later he became train despatcher and Superintendent of Telegraph, Assistant Superintendent (1886) and Superintendent. Mr. Goodell's appointment as General Superintendent became effective March 3.

—Mr. G. W. Vanderslice, Superintendent of the Lake Superior Division of the Northern Pacific, is 46 years old. He was born at Phœnixville, Pa. His railroad service dates from 1872, when he began as an operator for the Philadelphia & Reading. In 1882 he became train despatcher for the Northern Pacific and has continued with this company ever since. The following year he became chief despatcher, then Assistant Superintendent, and in 1891 was appointed Superintendent of the Manitoba Division. In 1901 Mr. Vanderslice took charge of the division south of the international boundary and remained there until his new appointment.

—Mr. John B. Dickson, who recently became Assistant Engineer of Maintenance of Way of the Baltimore & Ohio, was born at Steubenville, Ohio, in 1862. He entered railroad service in the maintenance of way department of the Pennsylvania Company at Wellsville, Ohio. In 1885 he was in the office of the Engineer of Maintenance of Way as a clerk, and two years later was appointed track supervisor. From this position he was appointed to the position of roadmaster of the Galena Division of the Chicago & North Western at Chicago and Sterling, Ill. He took his present position on Jan. 1, 1902. For five years Mr. Dickson was Secretary and Treasurer of the Roadmasters' Association.

—Mr. S. P. Hutchinson, who has recently succeeded Mr. English as Superintendent of the Pittsburgh Division of the Baltimore & Ohio, is 41 years old. He is a native of Pennsylvania and was educated at St. Paul's School at Concord, N. H., and at the University of Pennsylvania. He started with the Pennsylvania Railroad in 1881 as a rodman, and continued with this company until May 14, 1901, when he resigned to become Second Vice-President and General Manager of the El Paso & Southwestern. While with the Pennsylvania he served in the different capacities of Supervisor, Assistant Engineer, Division Superintendent and Assistant General Agent. Mr. Hutchinson has just resigned from the E. P. & S. W. to come to the Baltimore & Ohio.

—Major General S. B. M. Young, U. S. Army, has been detached from the command of the Department of California, March 15, and ordered to Washington, D. C., to organize and become President of the new Army War College for which Congress has been asked to provide the necessary appropriation. General Young was born in Pittsburgh, Pa., in 1840, and entered the Army as a volunteer private in 1861, and was four times brevetted for distinguished services during the Civil War. In 1866 he entered the Regular Army as a Second Lieutenant and was promoted to be a Major General in February, 1901. During the war with Spain he commanded a brigade of cavalry in Cuba. From July, 1899, to March, 1901, General Young rendered efficient service in the Philippines, part of the time as Military Governor of Northwestern Luzon, and since his return has been in command of the Department of California.

—Mr. Albert H. Hogeland, who on the first of this month became Assistant Chief Engineer of the Great Northern, was born Jan. 10, 1858, at Southampton, Pa. Mr. Hogeland entered railroad service in 1879, two years after graduating as a civil engineer from Lafayette College at Easton. His first railroad service was with the St. Paul & Pacific as a rodman and leveler, and from then until 1882 he held such positions as transitman, leveler and topographer. In that year he became Assistant Engineer of the Northern Pacific. This position he held for two years, and at the end of that time took a similar position on the St. Paul, Minneapolis & Manitoba. In September, 1884, he returned to the Northern Pacific, remained there one year and then returned to the St. Paul, Minneapolis & Manitoba. He has been with this company and its successor, the Great Northern, ever since. From 1885 to 1900 he was Assistant Engineer. Then for six years he was Engineer of Maintenance of Way of the Eastern district, later becoming Resident Engineer. As stated above, Mr. Hogeland assumed his new duties March 1, 1902.

—Gen. Thomas T. Eckert, who has been President of the Western Union Telegraph Company for nine years, has relinquished that office for the less active duties of Chairman of the Board of Directors, in which office he will continue as now to be Chairman of the Executive Committee. General Eckert will be succeeded as President by Col. Robert C. Clowry, Vice-President of the company, and General Superintendent of the Western Division at Chicago. General Eckert is now 77 years old, and has been prominent in telegraph management since 1866. In that year he was made Superintendent of the Eastern division of the Western Union. In 1875 he went to the Atlantic & Pacific as President, but the consolidation of that company in 1881 with the Western Union brought him back to the latter company, and in 1893 he succeeded Dr. Norvin Green as President. General Eckert became operator while he was postmaster at Wooster, Ohio, and superintended the construction of the telegraph line along the Pittsburgh, Fort Wayne & Chicago in 1852. He was in the Government Military service during the Civil War and was made Assistant Secretary of War in 1864. He retired a brevet Brigadier-General. Colonel Clowry is about 60 years old and began his telegraph service as operator at Joliet, Ill. He also was in the military telegraph service.

—Many of our readers will be grieved to hear of the death of Professor Leeds, of the Stevens Institute of Technology, which occurred at his home at Germantown on the 13th. For 21 years he has been at the head of the Department of Chemistry at Stevens, which department he organized, and his personality and his teaching are remembered with affection and gratitude by many engineers now in railroad service. Albert Ripley Leeds was born in Philadelphia June 27, 1843. He came of a line of Americans, many of whom have been devoted to engineering and scientific pursuits, a colonist of his name being in 1680 the Surveyor-General of New Jersey. Dr. Leeds was graduated from the High School of Philadelphia in 1860, and then entered Harvard, taking his degree in 1865. Before graduation he was appointed professor of chemistry in the Philadelphia High School, and,

during the following year, to equivalent chairs in the Franklin Institute, the Philadelphia Dental College, and Haverford College. The three latter professorships necessitated incessant lecturing and teaching, and in the attempt to discharge these duties, his health broke down. Resigning them in 1869, he went abroad, and spent two years in travel and study in England, France, Italy and Germany. On his return he was requested to organize the department of chemistry at the Stevens Institute of Technology. For many years he was active in writing and lecturing in analytical and technical chemistry, and made a distinguished reputation at home and abroad. He was a member of many learned and scientific societies. Some months ago he learned that he could not survive this year. In fact, it was thought that his death must come by mid-summer; but he chose to continue his work at Stevens to the end, and it was only about three weeks ago that he gave his last lecture there and bade farewell to the undergraduates and the faculty, and a few days before his death a committee of undergraduates carried a loving cup to him at Germantown. In all his useful life he did nothing more useful than these last few lectures and his last public act, for in these he gave to the young men an example of devotion and of sustained fortitude worthy of a place in the pages of Plutarch. Those young men who had the privilege of sitting under him in the last months of his life learned from him the most valuable lesson that any man could teach, the lesson of cheerful and serene courage even to death.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—Milton Player, Division Master Mechanic, with headquarters at Topeka, Kan., has resigned.

Atlanta & West Point.—B. F. Wyly, Jr., General Passenger Agent, with headquarters at Atlanta, Ga., has resigned.

Blackwell, Enid & Southwestern.—E. L. Peckham, heretofore General Manager, has been elected Second Vice-President, and Seely Dunn, Vice-President, will assume the duties of General Manager also. Headquarters at Blackwell, Okla. T.

Canadian Pacific.—Williams Apps, Master Car Builder, with headquarters at Montreal, Que., has resigned.

Burlington, Cedar Rapids & Northern.—John G. Farmer, heretofore Assistant General Passenger Agent, has been appointed General Passenger Agent. The position formerly held by Mr. Farmer has been abolished.

Central of New Jersey.—W. G. Besler, of Philadelphia, General Superintendent of the Philadelphia & Reading, has been appointed General Manager of the C. of N. J. The operating, engineering and roadway departments will report to Mr. Besler, whose appointment becomes effective at once.

W. W. Wentz, Jr., General Superintendent, being absent owing to ill health, M. M. Richey, Division Superintendent, has been appointed Acting General Superintendent.

Dallas Terminal Ry. & Union Depot.—H. T. Allen has been appointed Auditor, succeeding F. C. Fogarty, resigned.

Delaware, Lackawanna & Western.—G. A. Holden, General Coal Sales Agent, has resigned and E. E. Loomis, heretofore Superintendent of the Coal Mining Department, has been appointed to succeed Mr. Holden, with the title of Manager, with headquarters at New York City. R. A. Phillips succeeds Mr. Loomis at Scranton.

Galveston, Harrisburg & San Antonio.—W. B. Scott, heretofore Division Superintendent of the Gulf, Colorado & Santa Fe, has been appointed Division Superintendent of the G., H. & S. A., with headquarters at San Antonio, Texas, succeeding J. T. McQueeney, resigned on account of ill health.

Jacksonville & St. Louis.—E. M. Stanton has been appointed Acting General Manager, with headquarters at Jacksonville, Ill., succeeding his father, the late C. M. Stanton.

Lake Erie & Western.—The jurisdiction of H. F. Bickell, Division Superintendent at Lima, Ohio, has been extended over the Northern Ohio.

Mobile & Ohio.—Charles S. Clarke, heretofore General Superintendent, has been appointed General Manager, with headquarters at St. Louis, Mo., succeeding C. H. Ackert, resigned, effective March 15. (See Southern.)

Northern Ohio.—(See Lake Erie & Western.)

Northern Pacific.—A. M. Burt has been appointed Assistant Division Superintendent, with headquarters at East Grand Forks, Minn.

Philadelphia & Reading.—W. G. Wieand has been appointed Supervisor at Lebanon, succeeding J. R. C. Wrenshall, who has been transferred to Harrisburg, Pa., as Supervisor, succeeding H. B. Glisson, who in turn has been transferred to Bridgeport, Pa.

Southern.—J. M. Culp, heretofore Traffic Manager, has been appointed Fourth Vice-President in charge of the traffic departments, and C. H. Ackert, heretofore General Manager of the Mobile & Ohio, has been appointed General Manager, of the Southern, of all lines, except the St. Louis-Louisville Lines, with headquarters at Washington, D. C. T. C. Powell, heretofore Assistant Freight Traffic Manager, has been appointed Freight Traffic Manager; W. A. Turk, heretofore Assistant Passenger Traffic Manager, becomes Passenger Traffic Manager. Both with headquarters at Washington, D. C. Lee McClung succeeds Mr. Powell at Louisville, Ky. The positions of Traffic Manager and Assistant Passenger Traffic Manager have been abolished. Effective March 15.

Virginia & Southwestern.—Jas. L. Brass, General Manager, has resigned.

RAILROAD CONSTRUCTION.

ALABAMA ROADS.—Wagnon Bros., of Anniston, have taken a contract to build 5½ miles of railroad in Coosa County, Ala., for the Sample Lumber Co. The work is to be completed by July 1, and the grading will cost $15,000.

Engineers have run a line from Morganvillle on the Louisville & Nashville, to Hayneville in Lowndes County. Dr. W. P. Russell and W. Brewer, of Hayneville, are interested.

ARKANSAS & CHOCTAW.—It is said that the extension west from Arkinda, Ark., to Wichita Falls, Tex., is now in operation for 40 miles, and that considerable track laying has been done beyond that point. Surveys are also to be made for a line from Ashdown, Ark., to a point on the Mississippi. (Construction Supplement, March 14, 1902.)

BIRMINGHAM & VICKSBURG.—Announcement is made that surveys for this line from Vicksburg, Miss., by way of Canton to Tuscaloosa and Birmingham, Ala., are completed. The total distance is 266 miles and rights of way, it is said, are now being secured. The estimated cost is $14,000 per mile. (Construction Supplement, March 14, 1902.)

BLOOMSBURG & DANVILLE (ELECTRIC).—This company was incorporated in Pennsylvania March 7, with a capital stock of $66,000, to build an electric line 11 miles long in Columbia and Montour counties, from Bloomsburg, Pa., to Danville, South Danville and Riverside. M. F. D. Scanlan, of Bloomsburg, is President.

BUCKHANNON & NORTHERN.—Surveys are reported completed for this new line in West Virginia between Buckhannon, Upshur County, and Fairmont. The line is about 70 miles long, following the Buckhannon and Tygart's Valley rivers. E. F. Hartley, Charles Hawker and C. E. Conaway, who own extensive coal territory in Barbour and Taylor Counties, W. Va., are interested. They may be addressed at Fairmont.

BUFFALO & SUSQUEHANNA.—An officer writes that 11.2 miles of track were laid last year between Cross Fork and Oleona, and Ansonia and Asaph, Pa. In addition to this, 23.8 miles of main track logging road were laid, all in Pennsylvania.

CHESAPEAKE & CUMBERLAND.—This company was incorporated under the general laws of Maryland March 4, to build a railroad from Cumberland to the seaboard through Allegheny, Washington, Frederick, Montgomery, Prince George's and Anne Arundel Counties to terminate at or near Annapolis. The incorporators are Frank Shipley, L. T. Clark, H. Y. Hooper and others. The address of the last named is Baltimore. A bill was introduced in the State Senate March 12 to give the company enlarged powers in the way of consolidation, issues of bonds, etc.

CHICAGO, MILWAUKEE & ST. PAUL.—An officer writes in regard to the proposed extension from Eureka, S. Dak., to Linton, N. Dak., that surveys have been made, but there has been no decision in regard to building. (March 7, p. 169.)

CHICAGO, ROCK ISLAND & PACIFIC.—An officer sends the following revised estimate of mileage laid during 1901 on main lines and by companies affiliated: In Oklahoma by the Chicago, Rock Island & Pacific, 91 miles; in Texas by the Chicago, Rock Island & Mexico, 92 miles on the El Paso extension; in New Mexico from east line of territory to a point near the Pecos River on the Chicago, Rock Island & El Paso, 111 miles; in Illinois on the Midlothian & Blue Island, two miles, and between Enid and Watonga, Okla. T., on the Enid & Anadarko, 61 miles, making a total of 357 miles main track mileage laid during the year. Work is now in progress on two extensions: between Watonga and Anadarko in Oklahoma, 57 miles, and on the Chicago, Rock Island & Pacific proper from Lawton to a connection with the main line between Addington, Ind. T., and Sugden, 41 miles. In addition to the above work done, 19 miles of double track have been laid during 1901 in Iowa. It is also proposed to extend the Enid & Tonkawa from its present terminus at Billings, Okla. T., to the north line of Noble County, a distance of five miles.

CINCINNATI & INDIANA.—This company was incorporated in Ohio February 28, to build a railroad from Cincinnati through Hamilton and Butler Counties, Ohio, to Cottage Grove, Ind., where a connection will be made with the Cincinnati, Richmond & Muncie. The incorporation is by officers of the latter company, which will thus obtain an entrance to Cincinnati over its own tracks, instead of over those of the Cincinnati, Hamilton & Dayton. The distance from Cincinnati to Cottage Grove by the existing line is 47 miles.

CLARENDON & PITTSFORD.—An officer writes that an extension 4½ miles long is now building on this Vermont railroad betweeen Shangran and Pittsford. The company is doing its own work.

COLORADO & WYOMING.—An officer writes that 21 miles of track were laid by this company in Colorado during 1901, and that 12 miles more, between Weston and Torres, are now building by Clough & Anderson, of Walsenburg, Colo.

COLUMBUS, LIMA & MILWAUKEE.—An officer writes that 41 miles of track were laid during 1901 between Lima and Defiance, Ohio. The line is also building at present betweeen Lima and Columbus, Ohio, 50 miles, and is projected from Defiance to Saugatuck, Mich., 125 miles beyond. C. T. Hobart, of Defiance, Ohio, is Chief Engineer.

DENVER & RIO GRANDE.—An officer writes that a branch line 45 miles long is being located in Delta County, Colo., starting at Delta station. The location will soon be finished. There will be one crossing of the Gunnison River and two crossings of the North Fork of the same. The work will be in charge of M. H. Rogers, Consulting Engineer, Denver, Colo.

The alignment and grade of the line between Nathrop and Buena Vista, nine miles, are to be revised. The work includes two river crossings with high concrete abutments.

DE QUEEN & EASTERN.—Grading is reported well under way on this new line in Arkansas, which is to run from De Queen northeast 40 miles to Murfreesboro on the Arkansas Southwestern. The company was incorporated in September, 1900. It is said that the grade is now ready for track laying between De Queen and Lockesburg, 19 miles. Harry Large, of De Queen, is interested.

DES MOINES, IOWA FALLS & NORTHERN.—Work has now been resumed on this new line in Iowa and a large force is reported at work surfacing the track between Buckeye and Sherman. It is thought that the line will be in operation between Iowa Falls and McCallsburg by April 1. Surveys are also being made northeast from Iowa Falls. It was the original intention to extend the line to Osage, Iowa, but it is not known whether this is the objective point of the present survey or not. (Dec. 20, p. 883.)

EAST AND WEST ILLINOIS.—This company filed articles of incorporation at Springfield, Ill., March 11. It is proposed to build a railroad from Mount Carmel, Wabash County, Ill., through Lawrence, Wabash, Edwards, White, Wayne, Hamilton, Jefferson, Franklin, Williamson, Jackson, Union and Alexander Counties to the Mississippi River near Thebes, Ill. The air-line distance between Mt. Carmel and Thebes is about 120 miles. The incorporators are N. G. McLain, E. C. Schuetze and others of East St. Louis and St. Louis.

EL PASO & SOUTHWESTERN.—An officer writes that 50 miles of track were laid last year in Arizona, and 56 in New Mexico. Work is now in progress betweeen Douglas and El Paso, 143 miles, by Orman & Crook, of Pueblo, Colo., and Caples, O'Connor & Powers, of El Paso, contractors. A route is also projected from Fairbank to College Peak, Ariz., 53 miles.

GULF & BRAZOS VALLEY.—This company has notified the Texas Railroad Commission that it will extend its line from Spanish Fort to Stephenville, Tex., with a branch line to Fort Worth, a total of over 175 miles.

HARRIMAN SOUTHERN.—This company was incorporated in Tennessee March 3 to build a railroad from Harriman, Tenn., through Roane County, to some point on the Georgia-Tennessee State line between Blue Springs and Blue Mountain, where a connection will be afforded with other roads.

HILO.—An officer writes that this new line in Hawaii from Olaa Mill to the volcano of Kilauea, 17 miles, is graded for 15 miles, and that track has been laid on 10½ miles. B. F. Dillingham, Honolulu, is President, and W. H. Lambert, Hilo, is Superintendent.

HOLLY RIVER & ADDISON.—An officer writes that work is in progress on an extension from Addison Junction, W. Va., to Webster Springs. Grading is completed for the entire distance, which is 12 miles, and track has been laid for eight. The extension will be opened May 1. G. A. Hechmer, Palmer, W. Va., is General Manager.

HOUSTON, EAST & WEST TEXAS.—An officer writes that there is no truth in the current press report that this company is contemplating an extension from Shreveport, La., to Memphis, 300 miles.

IDAHO ROADS.—It is said that the owners of the Continental Mine in the northern part of Idaho near the British Boundary, will build a branch railroad 22 miles long from the line of the Great Northern to their mine. It is thought that it will be built this summer.

ILLINOIS CENTRAL.—It is said that a branch line is to be built between Paducah, Ky., and Cairo, Ill., 50 miles. Surveys are reported for over half this distance.

IMPERIAL & GULF.—This company filed articles of incorporation in California March 11, with a capital stock of $700,000, to build a railroad from Imperial Junction, on the Southern Pacific, to Imperial, a distance of 30 miles. It is also proposed to build branch lines from Imperial. W. F. Holt is President and General Manager, Los Angeles.

INTERNATIONAL & GREAT NORTHERN.—Announcement is made that a line is to be built from Navasota, Tex., northeast through Grimes and Madison Counties to Anderson and Madisonville, a distance of about 50 miles. It is said that it will also be continued beyond Madisonville to Corsicana, a total distance of about 125 miles. Surveys are being made in the same field by the Houston & Texas Central.

INVERNESS & RICHMOND.—It is reported that this new line in Nova Scotia, which is now in operation for about 57 miles, between Fort Hastings and Broad Cove, will this year be extended 40 miles northeast.

JONESBORO, NEWPORT & WESTERN.—The Arkansas Board of Railway Incorporators, chartered on March 3, a company to build a railroad from Jonesboro to Newport, Ark., a distance of about 40 miles, passing through a timber belt and a fertile valley between the White and Cache Rivers. The incorporators are: E. L. Westbrooke, G. W. Culberhouse, and others, of Jonesboro, and elsewhere.

KIOWA, CHICKASHA & FORT SMITH.—Work was reported begun March 8 on this new line, which was incorporated in 1899, to build from Kiowa, Kan., south about 450 miles by way of Chickasha, Ind. T., to Fort Smith, Ark. The present work is being done on the section between Chickasha and Fort Smith.

KLAMATH LAKE.—An officer writes that this new line in California is being built by the company's own force from Klamath Lake Junction, by way of Klamath River to Pokegama, which is just over the Oregon border, and is 25 miles from Klamath Lake Junction. A line is also being built from Pokegama, Ore., to Klamath Falls, Ore., a distance of 50 miles. There are several trestles on the line which are already built, and the company has on hand a steel bridge and ties for 20 miles of road; also 40 miles of 67-lb. iron rail and some rolling stock. Hervey Lindley, of Klamathon, Cal., is Vice-President and General Manager, and R. R. McLeod is Chief Engineer. (Feb. 21, p. 137.)

KLONDIKE MINES.—Application is being made to the Dominion Parliament by this company for permission to extend its line to the Stewart River, with branches along this river to its source, and to its entrance to the Yukon River. H. B. McGiverin, of Ottawa, is the applicant. (Construction Supplement, March 8, 1901.)

KONA-KAU.—It is said that the engineers now locating this projected line on the west coast of Hawaii, have chosen Kealakekua Bay as the site for the terminus of the line. It is proposed eventually to extend it to the volcano of Kilauea, where a connection will be afforded with the Hilo. See under Hilo above. (Jan. 17, p. 49.)

LAWTON, WICHITA MOUNTAIN & SUBURBAN.—This company was chartered in Oklahoma March 8, to build a railroad through the Fort Sill Reservation, by J. W. Howard, Samuel Huber and L. T. Reid, of Lawton.

LOUISVILLE & NASHVILLE.—It is said that curves are to be removed from the line between Montgomery and Flomaton, Ala., and that 10 miles of track between Flomaton and Greenville will be re-laid with new 80-lb. rails. The grade over Owassa Hill, now 33 ft. per mile for 4½ miles of the distance, and 40 ft. for 2½ miles, will be cut down to a maximum of 21 ft. per mile.

Bids were received March 5 for the construction of the Long Branch Coal Railroad which is to be built from Dale in Blount County, Ala., to coal lands to be developed by the Lehigh Valley Coal Co., seven miles distant. The estimated cost of the work is $100,000. (Jan. 10, p. 32.)

MARYLAND & PENINSULA.—This company was incorporated at Annapolis March 6, to build a railroad from Baltimore to Crisfield around the end of Chesapeake Bay. The total length of such a line could not be less than 175 miles. The motive power is not stated. The incorporators are: Chas. C. Harris, Chas. Burk, E. B. Owens and others.

MARYLAND & PENNSYLVANIA.—An officer writes in regard to the reported rebuilding of this line between Baldwin and Fallston, Md., four miles, that contracts were let March 10 to Shreve & Co., of Baltimore, for two miles of grading between these points. The work will take out some bad curves and also 13,053 ft. of trestles, and is part of a general scheme for straightening the entire line, which is to be carried along year by year. During 1902 a combination steel truss and viaduct crossing the Little Gunpowder River, and a viaduct 400 ft. long over what is known as the Overshot Crossing, will be built. The

contracts for the bridges have not yet been let. (Feb. 28, p. 153.)

MARSHALL & NORTHERN.—This company has been incorporated in Michigan to build a railroad from Tekonsha, Calhoun County, to Sunfield, Eaton County, a distance of about 50 miles. The capital stock is $200,000, and the directors are: E. E. Simmons, A. V. Watson and others, of Marshall, Mich. The articles of incorporation do not specify the kind of power to be used, but it is thought that it will be steam.

MEXICAN CENTRAL.—An officer writes that the only new line at present contemplated by this company is one between San Pedro and Treviño, in the State of Coahuila, to afford a connection between the main line and the old Monterey & Mexican Gulf, recently acquired and now being operated as the Monterey Division of the Mexican Central. The work is not yet sufficiently advanced to afford any definite information as to the location of the line or letting of contracts. (Feb. 7, p. 104.)

MEXICO ROADS.—The Mexican Government has just granted a concession to A. J. Peyton to build a railroad 45 miles long in the State of Michoacan, betweeen Acambaro and Morelia, Mex. No details can be obtained.

MILFORD & BEAVER.—It is announced that contracts for this new line in Utah, which is to run between the towns named, 42 miles distant, will be let some time between now and the first of May. Surveys are completed and right of way is practically secured. Henry Altman is President. (Feb. 14, p. 122.)

MISSOURI PACIFIC.—It is announced that 20 miles of track has been laid on the White River extension in Arkansas out of Batesville. The grading of the second 20-mile section is about half completed and right of way has been cleared along White River to the mouth of Buffalo River. (Construction Supplement, March 14, 1902.)

An officer writes, in regard to press reports that a line is to be built from Osage to Linn, Mo., that no such extension is contemplated.

NEWARK, ELKTON & EASTERN SHORE ELECTRIC.—This company was incorporated in Maryland March 11, to build an electric line designed to carry both freight and passengers, from the Delaware State line near Newark, Del., to Chesapeake City, Md., by way of Elkton, a distance of about 14 miles. Joseph H. Steele and Chas. S. Elliason, of Chesapeake City, and others, are incorporators.

NEW ORLEANS & MISSISSIPPI MIDLAND.—The engineer connected with this projected road in Mississippi and Louisiana writes that the project is now entirely dead.

NORFOLK & WESTERN.—Surveys are reported in Kentucky for a line 10 miles long between Dingess Station and Logan to open up coal veins.

NORTH CAROLINA ROADS.—Surveys are reported for a new lumber road which is to run from Fayetteville, N. C., to the plant of the Harnett Lumber Co., which is situated near Manchester, 17 miles from Fayetteville.

NORTHERN SECURITIES (CANADA).—Application has been made at Ottawa for a Dominion charter for a concern called the Northern Securities Company, with a nominal capital of $1,000,000. Officers of the American Company of this name say that they have no information in regard to this new incorporation. The incorporators are members of the law firm of McKibbon, Casgrain, Ryan & Mitchell.

OKLAHOMA & INDIAN TERRITORY.—Contracts have been closed for building this proposed line 18 miles long from Hickory, Ind. Ter., through Sulphur Springs to Davis, on the Atchison, Topeka & Santa Fe.

ONEONTA, COOPERSTOWN & RICHFIELD SPRINGS (ELECTRIC).—This company has filed a certificate of extension from Richfield Springs, N. Y., to Mohawk, 12 miles north. It now operates about 10 miles of electric line. H. T. Jennings, of New York, is Treasurer.

ONTARIO ROADS.—It is said that the following companies will receive subsidies from the Provincial Parliament now in session: Pembroke Southern, from Pembroke to Ross, not exceeding 15 miles; Bay of Quinte (formerly the Kingston, Napanee & Western), for the extension 50 miles north from Tweed to iron ore deposits; Irondale, Bancroft & Ottawa from Kinmount Junction to Irondale, 10 miles, and from a point 35 miles from Irondale, 10 miles east; also from Palmer Rapids to Renfrew, about 50 miles; new line from Dinorwic, on the Canadian Pacific between Fort William and Winnipeg, in the Algoma District, northerly to Lake Minetakie, 15 miles; Lindsay, Bobcaygeon & Pontypool, from Bobcaygeon to Lindsay, 16 miles; James Bay, from a point on the Canada Atlantic near Rose Point, to Parry Sound, five miles, and from a point near Parry Sound to a point on the Canadian Pacific near Sudbury, 90 miles; Thunder Bay, Nepigon & St. Joe, from a point 30 miles east of Port Arthur, 10 miles. The subsidies for these various projects amount to about $3,000 for each mile built.

ORIENTAL PACIFIC.—This company filed articles of incorporation in San Diego County, Cal., March 3, with the principal place of business San Diego. It is proposed to build a railroad 175 miles long from San Diego to the State boundary at Yuma. The capital is $3,500,000, of which 10 per cent. is said to be paid up, and the incorporators are: W. H. Carlson, F. H. Dixon, and others, of San Diego and Washington, D. C. In connection with the filing, a deed was recorded conveying to the new company certain franchises, including wharf and terminal facilities owned by the Los Angeles, San Diego & Yuma Co.

OREGON SHORT LINE.—An officer writes in regard to the proposed line between Garfield and Leamington, Utah, that it is expected that the line will be built during the coming season by the Oregon Short Line Co. direct. It will run from Garfield Beach, on the Oregon Short Line, about 18 miles west of Salt Lake City, southerly through Tooele, Stockton and Silver City, to a connection with the Oregon Short Line at Leamington Hill Spur, about six miles south of Leamington station. The line has been located and bids are now being received for grading, track laying, etc., and it is thought that work will begin by the fifth of April. There will be no iron or steel bridges or important trestles, but there will be one tunnel about 2,000 ft. long. Rails and rolling stock have been arranged for. (Feb. 28, p. 154.)

PAN-AMERICAN.—An officer of this road, which has received concessions to build from San Geronimo, Oaxaca, Mexico, along the coast to the frontier of Guatemala, about 310 miles, announces that several miles of grade have been completed between San Geronimo and Union Hidalgo, and that track laying will begin in a few weeks. It is thought that 28 miles of the line will be completed by July 1.

PENNSYLVANIA LINES WEST OF PITTSBURGH.—The recipients of the contracts for the elevation of tracks through Allegheny City, Pa., were announced March 10 by Chief Engineer Thomas Rodd as follows: Steel work, to the American Bridge Co., who will also lay the tracks; masonry work east of Federal street, to H. S. Kerbaugh; masonry work west of Federal street, to F. Gwinner, of Allegheny. Work is to begin April 1, and the estimated cost of the total improvement is about $2,000,000. (Feb. 21, p. 138.)

PHILADELPHIA & CAMDEN TUNNEL.—This company filed articles of incorporation at Trenton, N. J., March 5, with the purpose of building a tunnel to cost about $2,500,000 beneath the Delaware River between Philadelphia and Camden. The tunnel, according to present plans, will be rectangular in shape, 18 ft. high and 58 ft. wide, divided into four compartments, two for electric cars and two for pedestrians and vehicles. M. C. P. Parker, of Philadelphia, is President.

PITTSBURGH, TOLEDO & WESTERN (WABASH).—Proposals will be received at the office of the company in Pittsburgh on March 24 for grading and masonry on the Pittsburgh, Toledo & Western between Mingo Junction and Jewett, Harrison County, Ohio. Plans and specifications will be furnished at the company's office. J. W. Patterson, Chief Engineer. (Feb. 28, p. 164.)

SANTA FE, PRESCOTT & PHOENIX.—Work is reported in progress on a branch of this line from Huron, Ariz., eight miles west through mining camps on Big Bug Creek. Grant Bros., of Los Angeles, are the contractors, and W. A. Drake is Engineer.

An officer writes that the Crowned King line of the Bradshaw Mountain extension is located and 16 miles is under contract for grading during the year to Grant Bros., of Los Angeles. The total length of the line from Mayer to Crowned King is 27 miles. It will be difficult mountain work, with 3½ per cent. maximum grade. The maximum curves are 16 deg. There are no iron or steel bridges, but there are several high wooden viaducts and one 400 ft. tunnel. (Feb. 21, p. 138.)

SEABOARD AIR LINE.—In regard to reports that a new line is being built on the west coast of Florida below Tampa, an officer writes that the Seaboard Air Line is interested in a new line which is being built from Turkey Creek in a southwestern direction through the Manatee District to Palmetto, passing through Light Hall, Parish, Ellenton and other towns. The route has not as yet been entirely decided upon for the entire 50 miles. A stretch of about 20 miles is now completed. (Feb. 28, p. 154.)

10 000 tons of 75-lb. rail for June delivery have also been ordered, but the points at which this is to be laid have not as yet been entirely decided.

SIERRA OF CALIFORNIA.—According to recent reports, the main line of this company is now completed as far as the Stanislaus River crossing, 9½ miles from Jamestown, Cal. It is said that the entire line to Angeles, 19 miles, will be completed by the first of May. (Construction Supplement, Oct. 11, 1901.)

STILLMORE AIR LINE.—An officer writes that 20 miles of track were laid during 1901 between Swainsboro and Wadley, Ga., and that the line is building betweeen Wadley and Collins, a total distance of 55 miles. Geo. M. Brinson, Stillmore, Ga., is President. (Sept. 13, 1901, p. 644.)

TALLULAH FALLS.—An officer writes that a new line 38 miles long from Tallulah Falls, Ga., to Franklin, N. C., has been located. Contract for the first 5½ miles has been let and work is to begin at once. A. R. Gilchrist, Tallulah Falls, Ga., may be addressed.

TYRONZA CENTRAL.—(ST. LOUIS & SAN FRANCISCO).—An officer writes in regard to this new company, incorporated in Arkansas February 1, that the line leaves the St. Louis & San Francisco near Sedgwick, Ark., and is at present seven miles long. It is proposed to extend it 7.6 miles, two-thirds of a mile of which has been completed. Surveys have been entirely completed, the grading is finished and track laying is under way. The grading was done by S. Stanley, Koshkonong, Mo. The country is level and only one bridge is required, that across Little River. (Feb. 14, p. 122.)

VELASCO, BRAZOS & NORTHERN.—An officer writes in regard to the proposed extension from Anchor, Tex., north, that at present only preliminary surveys are being run. The road is now in operation between Velasco and Anchor, 20 miles, and the Texas Railroad Commission has authorized the issue on this of $200,000 bonds and $36,000 stock. For the present the proposed extension will not go beyond Duke, Tex., 20 miles, while connection will be made with other lines. A proposition from a western contracting firm to build the extension in return for bonds is now under consideration. I. H. Kempner, Galveston, Tex., is President. (March 7, p. 170.)

WASHINGTON ROADS (ELECTRIC).—A new electric line is being projected in the State of Washington from Rock Island, on the Great Northern at the Columbia River, to Waterville and thence northeast to Buckingham, a total of nearly 60 miles, crossing the upper part of Douglas County. The power is to be brought from Chelan Falls, near Waterville. Surveys are to be made at once. Geo. W. Hendricks, of Waterville, and H. Q. Wright, of Seattle, are interested.

YALAHA & WESTERN.—An officer writes in regard to this Florida line that it is at present in operation between Okahumpka, Fla., and the plant of the International Kaolin Co., 3½ miles, and is being extended by the Plant System from its present terminus to Yalaha, 4½ miles. The road is all graded and rails are being laid.

GENERAL RAILROAD NEWS.

ALGOMA CENTRAL & HUDSON BAY.—This company is making application to the Canadian Parliament through its solicitors, Messrs. Hamilton, Elliot & Irving, for permission to increase its bonding powers to $30,000 per mile.

CANADA ATLANTIC.—New bonds are to be issued on the entire system of this company at the rate of $25,000 a mile, and $1,200,000 on the St. Lawrence bridge at Coteau. The total issue will be $11,200,000 in 100-year 4 per cent. bonds, and these, it is said, have no connection with the sale of the road to the St. Lawrence & Adirondack interests. (See Feb. 7, p. 104). It is thought that the new issue is to retire the $4,950,000 bonds outstanding.

CANADIAN NORTHERN.—It is announced that this company has secured possession of the Esquimalt & Nanaimo, on Vancouver Island, B. C. This line is 70 miles long and runs to the Dunsmuir collieries at Nanaimo. It is not stated whether these large and important collieries were included in the transaction.

CHICAGO, ROCK ISLAND & PACIFIC.—The Chicago, Burlington & Quincy is reported to have sold to the above company the section of the Northern Connecting Line from Plattsburg, Mo., south to Kansas City, 41 miles. The Rock Island is to take possession of the new line April 1, and abandon the use of the Burlington tracks between Kansas City and Cameron, Mo.

CINCINNATI, NEWPORT & COVINGTON LIGHT & TRACTION.—This new holding company, incorporated March 11 with $10,000,000 authorized capital stock, half of which is 4½ per cent. non-cumulative preferred, will take over the Cincinnati, Newport & Covington Street R. R. and the Union Heat, Light & Power Co. This plan has been agreed upon by more than a majority of the stock of each of the companies involved. The holding company will issue and deliver $4,300,000 preferred, and $5,000,000 common stock in payment for all the stocks of the two companies; also $500,000 in cash to provide for improvements and extensions, etc. The balance, $700,000 par value preferred stock, will be held in the treasury to provide for future developments and acquirements. James C. Ernst, C. W. Wetmore, Julius Fleischmann and others are directors.

DANBURY & HARLEM.—This line, which, when completed will connect Danbury, Conn., with Golden's Bridge, N. Y., on the Harlem Division of the New York Central, and will parallel it to Bedford and Mount Kisco, in Westchester County, a total length of about 15 miles, was sold March 1 to the Westchester Traction Co. The purchasers, it is stated, propose to extend the line through to White Plains and Yonkers. It is now partially completed.

DENVER & RIO GRANDE.—Additional first consolidated mortgage 4 per cent. gold coupon bonds of 1936 to the amount of $2,400,000, have been listed by the New York Stock Exchange. These bonds have been used to acquire new rolling stock and bring the total amount listed to date to $31,050,000.

EAST ST. LOUIS ELECTRIC.—This property, together with other lines in East St. Louis, one of which crosses the Eads bridge, has been bought by E. W. Clark & Co., of Philadelphia. It is said that a general consolidation is planned, involving large sums of money to be spent on improvements, but the details have not as yet been arranged.

ERIE.—Additional general lien 4 per cent. gold coupon bonds of 1996 have been listed by the Stock Exchange to the amount of $1,028,000, bringing the total to date to $34,885,000. These bonds provide for the recent acquisition of Suspension Bridge & Erie Junction and Buffalo, Bradford & Pittsburgh bonds, completing the ownership of the entire issue of these companies' bonds by the Erie.

GREAT BRITAIN RAILWAYS DEVELOPMENT CORPORATION.—The *Commercial & Financial Chronicle* gives information in regard to this company to the effect that it was incorporated in New Jersey Dec. 17, 1901, with a nominal capital stock, to be largely increased, and with the purpose of controlling interurban electric roads in Great Britain. It is said that the $3,300,000 capital required for immediate needs has already been raised. The officers are: F. R. Pemberton, President; Ernst Thalmann, Vice-President, and B. S. Guinness, Treasurer. The directors also include John Skelton Williams, J. W. Middendorf and others. In a statement made by the President of the company it is stated that practically all of the capital will be furnished by American interests, but that the lines will be operated entirely by British companies.

MANHATTAN ELEVATED (NEW YORK).—Operation of the entire train service on the Second Avenue line by electricity was begun March 11, except for certain periods during the rush hours.

MANITOBA, MIDLAND & WESTERN.—The bill for this company, which it was desired to incorporate in order to bring the Northern Pacific into the Province of Manitoba, was killed in the Railway Committee of the Manitoba Legislature. The company asked permission to come in without any sort of aid, and it offered to submit to any control of rates the Government might impose.

MANITOULIN & NORTH SHORE.—Application has been made to the Dominion Parliament for authority to issue bonds to the extent of $30,000 per mile of the company's line.

NASHVILLE & CLARKSVILLE.—At a meeting of the stockholders April 15, vote will be taken on the purchase of the property and franchises of the Tennessee Central R. R., Nashville & Knoxville, and Tennessee Central Ry., and the making of a lease with the Nashville Terminal Co., and also of a new mortgage and bonds to be issued on these properties. The Tennessee Central was opened in 1900 and operates 55 miles of single track line between South Harriman and Monterey, Tenn. The Nashville & Knoxville is in operation between Monterey and Lebanon, Tenn., 79 miles.

PENNSYLVANIA.—At a meeting of the directors March 12, the following resolution was adopted: "Resolved, That for the purpose of providing the necessary funds for the purchase of 19,000 additional 50-ton steel cars, and 260 locomotives, . . . at an estimated cost of $24,000,000, and for . . . the tunnel extension of the company's system into New York, and the purchase of real estate required for the passenger station, the expenditures for which purpose for the years 1902 and 1903 are estimated at $20,000,000, and for other corporate purposes, the privilege be given to the stockholders of the company to subscribe . . . to an amount equal to 25 per cent. of their respective holdings to an issue of $50,000,000 gold bonds running for 10 years from Nov. 1, 1902." These bonds are to bear 3½ per cent. interest, and are convertible at the option of the holder into capital stock at $70 per $50 share on May 1, 1904, or any subsequent semi-annual interest period. They are liable to be called for redemption at 102 per cent., plus interest, at any interest period on or after May 1, 1904. The privilege of subscription may be sold in whole or in part by any stockholder, and the warrants will have thereon a form of assignment of the privilege. The subscription will take place between April 21 and May 1, 1902.

SOUTHERN PACIFIC.—This company filed articles of incorporation at San Francisco, Cal., March 7, by which it transferred to a new corporation all its holdings in California, Arizona and New Mexico, superseding the Southern Pacific R. R. Co. of California, the Southern Pacific R. R. Co. of Arizona, and the Southern Pacific R. R. Co. of New Mexico. Its capital stock is fixed at $159,445,000, and the old stock is to be canceled and new stock issued in its place.

WILKESBARRE & WESTERN.—This railroad, which extends from Watsontown, Northumberland County, Pa., to Orangeville, 30 miles distant, with one short branch, was sold at auction on March 10 to W. J. Turner, Chairman of the Bondholders' Committee. The price was $75,000 and there were no other bids. The sale took place at the instance of the Central Trust Co. of New York, trustee.